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TITLE: **NONWOVEN FABRIC, PRIMARY BACKING** FABRIC FOR CARPET,
CARPET AND WALL COVERING MATERIAL

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, D05C017/02

ABSTRACT:

PROBLEM TO BE SOLVED: To obtain a primary backing fabric for a carpet
excellent in characteristic balance among tufting and dyeing processabilities,
dimensional stability, etc., excellent in characteristics such as pile surface
grade or durability and rigidity, e.g. pile yarn withdrawal strength and a wall
covering material excellent in right side printing characteristics and resin
adhesion of the back surface.

SOLUTION: This nonwoven fabric is a continuous filament nonwoven fabric

comprising continuous filament web, composed of a low-melting polymer and a high-melting polymer and fixed by thermal fusion and has a difference in thermal adhesion strength between the face and back layers of the continuous filament nonwoven fabric. The **primary backing fabric for a carpet is the continuous filament nonwoven fabric having 0.15-0.4g/cm<SP>3</SP> apparent density**. The carpet comprises pile yarn tufted in the **primary backing fabric for the carpet and has a backing layer formed with a resin or a nonwoven fabric having 0.2-0.55g/cm<SP>3</SP> apparent density** thereof.

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(54)【発明の名称】　不織布およびカーペット用一次基布およびカーペットおよび壁材

(57)【要約】　（修正有）

【課題】タフト加工性、染色加工性や寸法安定性などの特性バランスが良く、かつパイル表面品位やパイル糸引抜き強等耐久性、剛性の特性にも優れるカーペット用一次基布およびカーペットおよび表面印刷特性と裏面の樹脂接着性ともに優れる壁材の提供。

【解決手段】低融点ポリマーと高融点ポリマーで構成された長繊維ウエブが熱融着により固定された長繊維不織布であって、該長繊維不織布の表裏層に熱接着強度差を設ける。またカーペット用一次基布は、不織布であって、該長繊維不織布の見掛密度が０．１５～０．４g/cm^{3}である。また、カーペットは、かかるカーペット用一次基布にパイル糸がタフティングされており、樹脂または不織布によるバッキング層を有する。壁材は、不織布であって、かつ、該長繊維不織布の見掛密度が０．２～０．５５g/cm^{3}である。

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【特許請求の範囲】

【請求項１】　低融点ポリマーと高融点ポリマーで構成された長繊維ウエブが熱融着により固定された長繊維不織布であって、該長繊維不織布の表裏層に熱接着強度差を設けたことを特徴とする不織布。

【請求項２】　該長繊維不織布の表層の熱接着強度が、ＪＩＳ　Ｌ－１９０６の摩耗強さ試験のテーバ形法に準じて測定される表層の摩耗強さが３級以上である請求項１記載の不織布。

【請求項３】　該長繊維不織布の裏層の熱接着強度が、ＪＩＳ　Ｌ－１９０６の摩耗強さ試験のテーバ形法に準じて測定される裏層の摩耗強さが３級以下である請求項１記載の不織布。

【請求項４】　該熱接着強度差が、ＪＩＳ　Ｌ－１９０６の摩耗強さ試験のテーバ形法に準じて測定される摩耗強さで表わしたとき少なくとも０．５級以上である請求項１～３のいずれかに記載の不織布。

【請求項５】　該長繊維不織布の表層の低融点ポリマー含有比率が裏層の低融点ポリマー含有比率よりも高い請求項１～４のいずれかに記載の不織布。

【請求項６】　該長繊維不織布の表層の高融点ポリマーと低融点ポリマーの比率が、９０：１０～６０：４０である請求項１～５のいずれかに記載の不織布。

【請求項７】　該長繊維不織布の裏層の高融点ポリマーと低融点ポリマーの比率が、９５：５～７０：３０である請求項１～５のいずれかに記載の不織布。

【請求項８】　該長繊維不織布の表層に含有される低融点ポリマーが、裏層に含有される低融点ポリマーよりも融点の低いポリマーで構成されている請求項１～７のいずれかに記載の不織布。

【請求項９】　該長繊維不織布が、表層を構成する単繊維の繊度の方が裏層を構成する単繊維の繊度よりも小さい繊維で構成されている請求項１～８のいずれかに記載の不織布。

【請求項１０】　該長繊維不織布が、その表層が高融点ポリマーが芯部、低融点ポリマーが鞘部からなる芯鞘型複合繊維で構成された不織布層（Ａ）、裏層が高融点ポリマーからなる繊維と低融点ポリマーからなる繊維の混繊で構成された不織布層（Ｂ）で構成されている請求項１～９のいずれかに記載の不織布。

【請求項１１】　該不織布層（Ａ）と該不織布層（Ｂ）が、ニードルパンチ処理されたものである請求項１０記載の不織布。

【請求項１２】　該長繊維不織布の繊維間が樹脂バインダーにより接着固定されている請求項１～１１のいずれかに記載の不織布。

【請求項１３】　該長繊維不織布の表裏層に樹脂バインダーの濃度勾配差を設けてなる請求項１２記載の不織布。

【請求項１４】　該高融点ポリマーの融点と該低融点ポリマーの融点差が、２０～８０℃の範囲にある請求項１～１３のいずれかに記載の不織布。

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【請求項１５】　該高融点ポリマーが、ポリエチレンテレフタレートであり、該低融点ポリマーが、共重合ポリエステルである請求項１～１４のいずれかに記載の不織布。

【請求項１６】　該長繊維不織布が、圧着部の総面積が不織布面積の５～３０％の範囲で熱圧着部を有する請求項１～１５のいずれかに記載の不織布。

【請求項１７】　請求項１～１６のいずれかに記載の不織布よりなり、かつ、見掛密度が０．１５～０．４g/cm^{3}であることを特徴とするカーペット用一次基布。

【請求項１８】　該不織布が、単繊維繊度２～１５ｄの繊維で構成されている請求項１７記載のカーペット用一次基布。

【請求項１９】　請求項１０～１１に記載の不織布からなり、不織布層（Ａ）と不織布層（Ｂ）の目付比率が１０：９０～６０：４０の範囲にある請求項１７記載のカーペット用一次基布。

【請求項２０】　請求項１７～１９のいずれかに記載のカーペット用一次基布にパイル糸がタフティングされており、かつ、樹脂または不織布によるバッキング層を有することを特徴とするカーペット。

【請求項２１】　パイル糸側が、該カーペット用一次基布の表層で、バッキング側が該カーペット用一次基布の裏層である請求項２０記載のカーペット。

【請求項２２】　該カーペットがタイル状に裁断されてなるタイルカーペットである請求項２０～２１のいずれかに記載のカーペット。

【請求項２３】　請求項１～１６のいずれかに記載の不織布よりなり、かつ、見掛密度が０．２～０．５５g/cm^{3}であることを特徴とする壁材。

【請求項２４】　該不織布が、単繊維繊度０．５～６ｄの繊維で構成されている請求項２３記載の壁材。

【請求項２５】　請求項１０～１１に記載の不織布からなり、不織布層（Ａ）と不織布層（Ｂ）の目付比率が３０：７０～９５：５の範囲にある請求項２３～２４のいずれかに記載の壁材。

【請求項２６】　該不織布の表層にプリントもしくは印刷が施されている請求項２３～２５のいずれかに記載の壁材。

【請求項２７】　該不織布の裏層に樹脂粘着層を有する請求項２３～２６のいずれかに記載の壁材。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、タフト加工性、パイル糸をタフティングしたパイル地の強力、染色加工性などカーペット製造時の加工性や寸法安定性などに優れた不織布、特にカーペット用一次基布およびパイル表面品位やパイル糸引抜き強さなどの耐久性、剛性等の特性

に優れたカーペットおよび表面印刷性と裏面の樹脂接着性に優れた壁材に関するものである。

【0002】

【従来の技術】現在、カーペット用一次基布としては、ポリプロピレンフィルムスリットヤーンの織物、ジュート基布、スパンボンド法による長繊維不織布等が使用されている。なかでも、パイル糸の整然性が良く、繊維のほつれが生じないなどの利点からスパンボンド法による長繊維不織布を用いたカーペット用一次基布が増加しつつあり、例えば特公昭61－8189号公報で提案されているように、熱可塑性合成樹脂を加熱溶融し多数の細孔を有する紡糸口金より押し出し、高速吸引するエジェクターで吸引延伸しフィラメントを移動するネット上に捕集、目標とする目付とした後、ニードルパンチにより繊維を機械的に絡合し、さらに接着剤によって互いに接着させて得られるカーペット用不織布や、特開平3－104973号公報で提案されているポリエチレンテレフタレートを芯成分として低融点成分が繊維の表面を全面的に覆っている芯鞘複合繊維を用い、エンボスロールで熱圧着させて得られるカーペット用不織布、さらに特公平3－17948号公報で提案されている、ポリエステルフィラメントが長さ方向、幅方向に折り返されて積層された直交組織の不織布製造において接着成分に前期ポリエステルフィラメントよりも融点の低い共重合ポリエステルなどをエアージェット装置に供給する前にすだれ状にして前記ポリエステルフィラメントと混繊した後、熱シリンダーを通して熱溶着させてなるカーペット用不織布などが採用されている。

【0003】タフテッドカーペットは、これら一次基布にパイル糸をタフティングマシンを使用して、タフトし、いわゆるパイル地を作成し、ループスチーマータイプの連続染色機等によりパイル糸の染色を行った後、パイル地の裏側に塩化ビニル樹脂ペースト、スチレンーブタジエンラバー（SBR）樹脂、エチレン－酢酸ビニル共重合樹脂等の各種樹脂を使用して、あるいは樹脂を使用せず不織布をニードルパンチすることによりバッキングされて製造されている。タフテッドカーペットの中でも、タイルカーペットは、樹脂バッキング等の後、例えば、50cm角の正方形などのタイル状に裁断されて製造されるものである。

【0004】また、壁材には、スパンボンド法などにより製造された不織布にプリントあるいはグラビア印刷などの印刷を施したものが用いられている。

【0005】

【発明が解決しようとする課題】このようなカーペット用一次基布は、例えば、タフトしたパイル糸の整然性が良く、基布の繊維がパイル糸の表層部に浮き出ないこと、またパイル把持力に優れ、目とび現象やパイル抜けが少ないこと、染色工程においては、工程張力による幅収縮が小さいこと、バッキング工程での熱寸法安定性に

優れていることや裁断時に基布裁断面から毛羽発生がないことなど加工性に優れ、かつ低価格であることが要求されている。また、カーペットとして使用に耐え得る要求特性には、パイル糸引抜き強さなどの耐久性や剛性等があげられる。

【0006】しかしながら従来のカーペット用一次基布では、例えばニードルパンチにより繊維を機械的に絡合させた後、エマルジョン系バインダーなどの接着剤を付与して繊維を結合させて得られたカーペット用一次基布では、ニードルパンチ工程やエマルジョン系バインダーの乾燥工程が必要であるため価格的に高いものであり、また厚みが厚いものとなるためにパイル糸の使用量が多くなり、カーペットの重量が重くなったり、コストが高くなるなどの問題が生じ、また、高融点成分を芯部、低融点成分を鞘部に用いた芯鞘型複合繊維により得られたウエブをエンボスロールなどにより熱圧着させて得られたカーペット用一次基布は、全繊維が接着繊維であるため強固に接着する傾向があり、タフト時にタフトニードルによる基布貫通抵抗が大きくなる結果、基布の繊維切断を生じやすく、パイル地の強力低下の傾向が認められ、また、騒音が大きくなるといった問題があり、また高融点成分繊維と低融点成分繊維の混繊により得られたウエブをエンボスロールなどにより熱圧着させて得られたカーペット用一次基布は、低融点成分繊維の比率が少ないと繊維間接着力が低く、タフト時にタフトニードルにより基布の繊維がパイル糸の表層部に押し出されやすくカーペットの品位が悪いものとなる傾向にあり、また、連続染色時のループスチーマー通過時には湿熱状態下で加工張力が加わるため寸法変化が大きくなり、カーペットの規定幅が得られず製品の歩留まり不良を起こしたり、逆に、低融点成分繊維の比率が多いとタフト時にタフトニードルにより繊維切断を生じやすく、また高融点成分繊維本数が少なくなり繊維間接着点数が少なくなるため、加工に耐え得る基布強力が得られないなど、各工程における複数の要求特性をバランス良く得ることが困難であるために、タフト加工性、染色加工性や寸法安定性などカーペット製造時の全ての工程において満足すべき加工性を得ることが難しく、ある工程における加工性や特性については妥協し得る範囲で使用されているのが現状であった。

【0007】また、従来のカーペット、たとえばタフテッドカーペット用一次基布を使用することにより得られるタフテッドカーペットは、特に不織布が接着剤により繊維間接着された一次基布や、芯鞘型複合繊維のみで構成された一次基布を使用して得られるタフテッドカーペットは、一次基布のバッキング側に位置する表面の繊維が強固に接着され平滑であるがために、バッキング樹脂が適度に一次基布内に浸透しないために一次基布とバッキング層と接着が不十分なものとなり、長期の歩行やキャスター付き椅子の使用による摩耗やパイル抜けといっ

たパイル糸引抜き強度不足などの耐久性について満足できるものではなかった。

【０００８】また、従来の不織布を用いた壁材は、表面印刷特性を重視するあまり、表裏層とも強固に繊維間接着されて平滑に仕上げられているために、樹脂により壁に不織布を貼った場合には、不織布と樹脂との界面での接着力が小さく、場合によっては不織布が剥がれ落ちる不都合があった。

【０００９】本発明は、かかる従来の不織布、特にタフテッドカーペット用一次基布および壁材に鑑み、タフト加工性、染色加工性や寸法安定性などの特性をバランス良く有し、しかもタフテッドカーペットに製造された後のパイル表面品位やパイル糸引抜き強さなどの耐久性、剛性などの特性にも優れるカーペット用一次基布およびカーペットおよび表面印刷特性と裏面の樹脂接着性ともに優れる壁材を提供せんとするものである。

【００１０】

【課題を解決するための手段】本発明は、かかる課題を解決するために、次のような手段を採用するものである。

【００１１】すなわち、本発明の不織布は、低融点ポリマーと高融点ポリマーで構成された長繊維ウエブが熱融着により固定された長繊維不織布であって、該長繊維不織布の表裏層に熱接着強度差を設けたことを特徴とするものであり、また、本発明のカーペット用一次基布は、かかる不織布であって、かつ、該長繊維不織布の見掛密度が０．１５～０．４g/cm³ であることを特徴とするものである。また、本発明のカーペットは、かかるカーペット用一次基布にパイル糸がタフティングされており、かつ、樹脂または不織布によるバッキング層を有することを特徴とするものであり、本発明の壁材は、前記不織布であって、かつ、該長繊維不織布の見掛密度が０．２～０．５５g/cm³ であることを特徴とするものである。

【００１２】

【発明の実施の形態】本発明は、タフト加工性、染色加工性や寸法安定性などタフッテドカーペット製造時の全ての工程において満足すべき加工性を得る特性をバランス良く有し、かつカーペットに製造された後のパイル表面品位や耐久性などにも優れたカーペット用一次基布を提供できないものか、鋭意検討したところ、各製造工程および製品に要求される各々の特性に対し、各々の機能を長繊維不織布の表層と裏層とにバランス良く分担させることにより、上述の要求を見事に達成することができることを究明したものである。また、かかる不織布を分析したところ、意外にも壁材として好適な性質を有することを究明したものである。

【００１３】すなわち、本発明における基本的思想は、低融点ポリマーと高融点ポリマーで構成された長繊維ウエブが熱融着により固定された長繊維不織布の表裏層に熱接着強度差を設け、かつカーペット用一次基布および

壁材の機能に好適な特定の見掛密度を有することにある。つまり、長繊維不織布の表層の熱接着強度を高くすることにより、加工に耐え得る強度、寸法安定性を付与し、かつカーペット製品の剛性をアップし、さらにパイル側に長繊維不織布の表層を配することでパイル表面上に発生する不織布からの毛羽を抑制し、優れたカーペット表面品位をもたらしめることができ、長繊維不織布の裏層の熱接着強度を表層より低く抑えることにより、表層の機能では得ることのできない特性、例えばタフト時のタフトニードルによる基布貫通抵抗と繊維切断の抑制やパイル糸との絡みによるパイル把持力の付与といった特性、さらには低熱接着強度であるためにタフト加工により繊維がウエブ状化し低密度な不織布層となり、バッキング側に配することでバッキング樹脂の適度な浸透性を与えてアンカー効果によるバッキング層との接着効果をもたらしめカーペットのパイル引抜き強さなどの耐久性を発揮せしめることができるものであり、これら長繊維不織布の表裏層の相乗効果により、それぞれの不織布層が単独で有する機能をバランス良く有するため、カーペット製造時の全ての工程において満足すべき加工性を得るカーペット用一次基布を提供でき、またかかる一次基布を用いて得られるカーペットは、優れたカーペット表面品位と長期の歩行やキャスター付き椅子の使用に耐え得る耐久性を備えたカーペット、特にタフテッドカーペットを提供することができるものである。

【００１４】この長繊維不織布の表裏層の特性は、意外にも壁材としての特性と共通するものがある。つまり、長繊維不織布の表層の熱接着強度を高くすることにより、プリントやグラビア印刷といった表面印刷特性に優れたものとなり、長繊維不織布の裏層の熱接着強度を表層より低く抑えることにより、不織布を木材やコンクリートなどの壁に樹脂接着剤を用いて貼り合わせる際に、樹脂接着剤が不織布内に浸透しやすく不織布裏層の繊維がアンカーの機能を担うことにより、優れた接着性能を得ることができるものであり、表面印刷特性と樹脂接着性ともに優れた壁材を提供することができるものである。

【００１５】これらの機能を得るには、長繊維不織布の表層の熱接着強度は、ＪＩＳ　Ｌ－１９０６の摩耗強さ試験のテーバ形法に準じて測定される摩耗強さが３級以上が好ましく、より好ましくは３．５級以上、特に好ましくは４級以上が好ましい。長繊維不織布の表層の摩耗強さが３級未満の場合は、熱接着強度が低いために、タフテッドカーペット用一次基布として用いる場合、加工張力に耐え得る強度が得られなくなり加工中に幅収縮が生じ、製品規定幅が得られず歩留まりの悪化を招いたり、必要な剛性が得られにくくなる、さらにパイル表面上への不織布からの繊維が浮き出て、いわゆる毛羽が発生するなどの問題が発生するため好ましくなく、壁材として用いる場合には、表面の平滑性が得られにくく、プ

リントや印刷時にインクのにじみが生じやすく、また長期にわたって使用されたときに繊維が毛羽状に発生するため外観が損なわれやすいため好ましくない。

【００１６】また、長繊維不織布の裏層の熱接着強度は、ＪＩＳ　Ｌ－１９０６の摩耗強さ試験のテーバ形法に準じて測定される摩耗強さが３級以下が好ましく、より好ましくは１．５級以上３級以下、特に好ましくは２級以上２．５級以下であることが好ましい。長繊維不織布の裏層の摩耗強さが３級を越える場合は、熱接着強度が高くなる結果、不織布が硬くなりすぎてタフテッドカーペット用一次基布として用いる場合、タフト時のタフトニードルによる基布貫通抵抗が増大し騒音が大きくなる傾向や、不織布の繊維切断が発生しタフト後のパイル地の強力が低下するために加工中の寸法変化が大きくなり、場合によっては加工時にシート切れを生じる問題が生じ、さらにバッキング時にバッキング樹脂の浸透が不十分となり、タフテッドカーペットのパイル引抜き強さなどの耐久性に劣るなどの問題が発生するため好ましくなく、壁材として用いた場合には、表面が平滑過ぎるために、木材やコンクリートなどの壁に樹脂接着剤を用いて貼り合わせる際に、樹脂接着剤が不織布内に浸透しにくく、十分な接着力を得ることが難しくなるため好ましくない。

【００１７】さらに好ましくは、長繊維不織布の表層と裏層の熱接着強度差は、ＪＩＳ　Ｌ－１９０６の摩耗強さ試験のテーバ形法に準じて測定される摩耗強さで表したとき少なくとも０．５級以上であることが、上記機能を長繊維不織布の表層と裏層とにバランス良く分担させることができるために好ましく、特に好ましくは、熱接着強度差が長繊維不織布の表層から裏層にかけて段階的な接着強度勾配を有することが好ましい。

【００１８】長繊維不織布の表裏層に熱接着強度差を設けるために、特に表層の摩耗強さが３級以上、裏層の摩耗強さが３級以下の特性を有するために、以下のような不織布の構造形態にすることが好ましい。なお、以下に述べる不織布の構造形態については、単独に用いても良く、より好ましくは２つ以上を組み合わせることが好ましい。

【００１９】まず第１に、長繊維不織布の表層の低融点ポリマー含有比率が、裏層の低融点ポリマー含有比率よりも高くするすることが好ましく、この際、より好ましくは長繊維不織布の表層の高融点ポリマーと低融点ポリマーの比率が９０：１０～６０：４０、裏層の高融点ポリマーと低融点ポリマーの比率が９５：５～７０：３０であることが好ましく、特に好ましくは、長繊維不織布の表層の高融点ポリマーと低融点ポリマーの比率が８５：１５～７０：３０、裏層の高融点ポリマーと低融点ポリマーの比率が９０：１０～８０：２０であることが好ましい。長繊維不織布の表裏層の低融点ポリマー含有比率を同じにすると、表裏層に熱接着強度差を設けることが困難となる。

【００２０】また、長繊維不織布の表層の低融点ポリマー含有比率が４０％を越えると、熱融着時にポリマーが溶融してシート全体がフィルム化の傾向になり、タフト時の基布貫通抵抗が大きくなる傾向があるほか、価格的にも好ましくなく、逆に低融点ポリマー含有比率が１０％未満の場合は、摩耗強さ３級以上を得ることが難しくなる傾向があり、繊維間の熱接着が不十分なりやすく必要なシート強度が得難い、またパイル表面上への毛羽が発生しやすくなるなどの好ましくない傾向が生じる。

【００２１】長繊維不織布の裏層の低融点ポリマーの比率が、３０％を越えると繊維間接着が強くなり過ぎ、摩耗強さ３級以下を得ることが難しくなる傾向があり、タフト時における繊維切断が生じやすい上に、高密度化しやすくために樹脂の浸透が不十分となり易く、逆に低融点ポリマーの比率が５％未満の場合、不織布形態保持に必要な接着強力が得られにくくなるために、加工時にシートそのものが毛羽立ち、ももけ易くなりロールなどに毛羽繊維が巻き付いたりするなど加工搬送上の問題が発生しやすい傾向があり好ましくない。

【００２２】第２に、長繊維不織布の表層に含有される低融点ポリマーの融点の方が、裏層に含有される低融点ポリマーの融点よりも低いポリマーで構成されていることが好ましい。

【００２３】長繊維不織布の表層に含有される低融点ポリマーの融点と裏層に含有される低融点ポリマーの融点との差がない場合は、表裏層での熱接着強度差を得難い傾向にある。特に、長繊維不織布の表裏層の熱接着強度差をＪＩＳ　Ｌ－１９０６の摩耗強さ試験のテーバ形法に準じて測定される摩耗強さで表したとき少なくとも０．５級以上とするために、より好ましくは長繊維不織布の表層に含有される低融点ポリマーの融点が裏層に含有される低融点ポリマーの融点よりも５～５０℃低い、特に好ましくは１０～３０℃低いポリマーであることが好ましい。

【００２４】また、低融点ポリマーの融点は、高融点ポリマーの融点以下２０～８０℃であることが好ましく、より好ましくは、３０～５０℃である。低融点ポリマーの融点と高融点ポリマーの融点差が３０℃未満の場合は、繊維間接着強度が不十分となる傾向があり、融点差が８０℃を越える場合は、不織布製造時の繊維紡出時の不安定さからくる単糸切れといった紡糸性不良を招き易い。

【００２５】第３に、長繊維不織布の表層を構成する単繊維の繊度の方が、裏層を構成する単繊維の繊度よりも小さいことが、表層のおける繊維間接着点数が多くなり表裏層における熱接着強度差を設けることができることから好ましい。

【００２６】この際、単繊維の繊度は、カーペット用一次基布に用いる場合は、タフト時の繊維切断の抑制と不

繊布の強度などの観点から2～15デニールが好ましく、より好ましくは6～10デニールであることが好ましく、単繊維の繊度が2デニール未満の場合、タフト時のタフトニードルにより繊維切断を生じやすく、パイル地の強力が低下する傾向にあり、15デニールを越えると単位目付当たりの構成繊維本数が少なくなり、繊維間の接着点数が少なくなる傾向にあるため、加工に耐え得る強力を得難くなるためであり、壁材に用いる場合は、不織布製造時の紡糸性や壁材としての印刷特性などの観点から、0．5～6デニールが好ましく、より好ましくは1～3デニールが好ましい。

【0027】なかでも、長繊維不織布の表層の摩耗強さが3級以上、裏層の摩耗強さが3級以下の特性を有し、表裏層の熱接着強度差をＪＩＳ　Ｌ－1906の摩耗強さ試験のテーバ形法に準じて測定される摩耗強さで表したとき少なくとも0．5級以上とするために、好ましくは、カーペット用一次基布の場合、表層を構成する単繊維の繊度が4～7デニール、裏層を構成する単繊維の繊度が7～12デニールであることが好ましく、壁材の場合は、表層を構成する単繊維の繊度が1～2デニール、裏層を構成する単繊維の繊度が3～5デニールであることが好ましい。

【0028】第4に、長繊維不織布の表層が高融点ポリマーが芯部、低融点ポリマーが鞘部からなる芯鞘型複合繊維で構成された不織布層（Ａ）、裏層が高融点ポリマーからなる繊維と低融点ポリマーからなる繊維の混繊で構成された不織布層（Ｂ）が積層されているものが好ましい。つまり、表層は、全繊維が熱接着繊維としての機能を持つ芯鞘型複合繊維で構成された不織布層（Ａ）であるため、裏層の混繊で構成された不織布層（Ｂ）と比較して熱接着強度が得られやすく、長繊維不織布の表裏層での熱接着強度差が容易に得ることができるためである。

【0029】この際、不織布層（Ａ）と不織布層（Ｂ）の目付比率は、カーペット用一次基布に用いる場合、10：90～60：40が好ましく、より好ましくは30：70～50：50である。芯鞘型複合繊維で構成される不織布層（Ａ）の目付比率が10％未満となると、基布トータルの接着強度が低くなり、加工張力に耐え得る強度が得られなくなり加工中に幅収縮が生じ、製品規定幅が得られず歩留まりの悪化を招いたり、必要な剛性が得られにくくなる、またパイル表面上への毛羽が発生するなどの問題が発生する傾向にあり、逆に不織布層（Ａ）の目付比率が60％を越えると、基布が硬くなりすぎる結果、タフト時の基布貫通抵抗が大きくなり騒音が大きくなる傾向や、繊維切断が発生しタフト後のパイル地の強力が低下する傾向にある。また、壁材に用いる場合の不織布層（Ａ）と不織布層（Ｂ）の目付比率は、30：70～95：5が好ましく、より好ましくは50：50～80：20である。芯鞘型複合繊維で構成される不織布層（Ａ）の目付比率が30％未満となると、表層の表面平滑性得ることが難しくなる傾向にあり、不織布層（Ａ）の目付比率が95％を越えると、裏層の表面も平滑になり過ぎる傾向が認められ、樹脂接着剤との接着性が得にくくなる傾向にある。

【0030】また、本発明において不織布層（Ａ）と不織布層（Ｂ）の層間の結合を強固にして一体化させるために、熱融着する前に、ニードルパンチ処理を施し、不織布層（Ａ）と不織布層（Ｂ）の層間に存在する繊維を交絡させても良い。この場合より好ましくは、タフト後のパイル表面上に毛羽発生を抑制するために、表層である不織布層（Ａ）側からニードルパンチ処理を行うのが良い。

【0031】第5に、長繊維不織布の繊維間が樹脂バインダーにより接着固定されており、表裏層に樹脂バインダーの濃度勾配差を設けているものが好ましい。

【0032】長繊維不織布の表裏層に樹脂バインダーの濃度勾配差を設ける方法としては、エマルジョンタイプの樹脂バインダーを含浸した後、樹脂バインダーを表層側にマイグレーションさせながら乾燥させる方法、エマルジョンタイプの樹脂バインダーを長繊維不織布の表層側からスプレー噴霧やロールによる付与、ドクターナイフによる付与等した後乾燥させる方法などを用いることができる。

【0033】樹脂バインダーの種類としては、アクリル酸エステル系樹脂、酢酸ビニル樹脂、エチレン－酢酸ビニル共重合樹脂、塩化ビニル樹脂、ポリエステル系樹脂、スチレン－ブタジエンラバー、メタクリル酸メチル－ブタジエンラバー、アクリロニトリル－ブタジエンラバーなどを用いることができる。

【0034】この際、樹脂バインダーの長繊維不織布に対する付与量は、強度、風合などの観点から5～30重量％であることが好ましい。

【0035】第6に、長繊維不織布の表裏層に熱接着強度差を設けるための熱融着方法は、1対のエンボスロールを用いて上下ロールに温度差を設け、長繊維不織布の表層側の温度を高くすることやサクションドラムを用いて表層側から熱風を付与することが好ましく用いることができる。

【0036】エンボスロールを用いる場合、圧着面積は、5～30％が好ましく、より好ましくは15～25％である。圧着面積が10％未満の場合は、接着面積が少ないため加工に耐え得る強度が得られにくく、圧着面積が30％を越えると、シート全体が接着されてフィルム化する傾向となるため、タフト時の基布貫通抵抗が大きくなる問題が発生しやすいからである。

【0037】さらに、カーペット用一次基布として用いる場合は、長繊維不織布の見掛密度は、0．15～0．4g/cm³ の範囲である必要があり、より好ましくは、0．22～0．3g/cm³ の範囲であることが好ましい。

長繊維不織布の見掛密度は、0．15g/cm³ 未満であると、厚みが厚すぎる傾向にあり、パイル糸をタフトした時に、必要とされるパイル高さを得るためにパイル糸の使用量が増加するために、コスト的に好ましくなく、逆に長繊維不織布の見掛密度が0．40g/cm³ を越えると、タフト時のタフトニードルによる基布貫通抵抗が大きくなり騒音が増加する傾向やバッキング時にバッキング樹脂の基布内への浸透が不十分となるためにカーペットのパイル引抜き強さが不十分となる傾向にあり好ましくない。

【0038】また、壁材として用いる場合は、長繊維不織布の見掛密度は、0．2～0．55g/cm³ の範囲である必要があり、より好ましくは、0．25～0．5g/cm³ の範囲であることが好ましい。長繊維不織布の見掛密度は、0．2g/cm³ 未満であると、密度が小さすぎる結果、印刷等を行う際にインクのにじみが発生する傾向にあり、逆に長繊維不織布の見掛密度が0．55g/cm³ を越えると、風合が固くなり過ぎ、壁に貼り合わせる作業の際に皺などが発生しやすい傾向にあり好ましくない。

【0039】本発明で使用される高融点ポリマーは、ポリエステル、ポリプロピレン、ポリアミド、ポリエチレンなどどのようなポリマーを使用しても良いが、高強度、熱寸法安定性、耐候性などの点から、とりわけポリエチレンテレフタレートが好ましく使用される。また、低融点ポリマーについてもポリエステル、ポリプロピレン、ポリアミド、ポリエチレンなどいずれのポリマーを使用しても良いが、不織布製造時の紡糸安定性および噴射衝突板帯電によるシート目付均一性などの点から、アジピン酸共重合ポリエステルやイソフタル酸共重合ポリエステルなどの共重合ポリエステルが好ましい。

【0040】なお、本発明のカーペット用一次基布には必要に応じて、タフト時の繊維切断を抑制するためにポリジメチルシロキサンなどの平滑剤を付与することも可能である。

【0041】以上のように得られたカーペット用一次基布を用いて、パイル糸をタフトし、樹脂あるいは不織布によるバッキングを施すことにより、特に熱接着強度の強度の高い表層をパイル側に、比較的低密度で熱接着強度の低い裏層をバッキング側に配置することによりパイル表面上に毛羽発生のないカーペット品位とパイル引抜き強さなどの耐久性、剛性に優れたカーペット、特にタフテッドカーペットやタイルカーペットを得ることができるのである。また壁材として用いる場合には、壁への貼り合せ作業を簡便に行なうため、長繊維不織布の裏層側に樹脂粘着層を有することが好ましい。

【0042】

【実施例】以下実施例に基づき更に詳細に説明するが、本発明が以下の実施態様のみに限定されるものではないことは言うまでもない。なお、実施例ににおける各特性の評価方法は、次の通りである。

【0043】（1）長繊維不織布の見掛密度

長繊維不織布の厚さは、走査型電子顕微鏡（SEM）を用い、拡大倍率100倍で厚み断面写真を撮影、1m² 当たり厚み方向寸法20点をノギスで測定した平均値を倍率から厚みを逆算して、次式により見掛密度を算出した。

【0044】（見掛密度）＝（長繊維不織布の目付）／（長繊維不織布の厚さ平均値）

（2）長繊維不織布の摩耗強さ

表裏層について、JIS L－1906-1994 の摩耗強さ試験のテーバ形法に準じて測定し、0．5級単位で評価した。

【0045】（3）長繊維不織布の引張強力

JIS L－1906-1994 に準じて測定した。なお、不織布の長手方向をタテ、幅方向をヨコと記載した。

【0046】（4）タフテッドカーペット用一次基布のタフトニードルによる基布貫通抵抗値1／10ゲージに設定した44本のタフトニードル（22本2列配置スタッガー、ニードル種；オルガン（株）製KPE－41）を定速伸長型引張試験機にセットし、速度20cm/min. でタフテッドカーペット用一次基布（不織布）に垂直に突き刺した時の最大荷重を測定した。

【0047】このときの最大荷重が18kgf 未満を○、18kgf ～23kgf 未満を△、23kgf 以上を×として評価した。

（5）パイル地の引張強力

タフティングマシンを用い、タフテッドカーペット用一次基布にパイル糸（ナイロンBCF、2600デニール160フィラメント）を1／10ゲージ、ステッチ12本／インチ、パイル高さ3．5㎜でループ状にタフトしてパイル地を得た後、JIS L－1906-1994 に準じて測定した。なお、タフテッドカーペット用一次基布の長手方向（タフト方向）をタテ、幅方向をヨコと記載した。

【0048】（6）連続染色時寸法安定性

前記（5）で得られたパイル地をループスチーマータイプの連続染色機にてパイル糸の染色を行い、染色前後における幅方向の幅寸法変化（幅収縮率）を測定した。

【0049】なお、幅収縮率は｛（染色前の幅寸法－染色後の幅寸法）／染色前の幅寸法｝×100（%）にて算出した寸法安定性は、この幅収縮率が、8%未満を○、8～10%を△、10%以上を×として評価した。

【0050】（7）タフテッドカーペットの表面品位

前記（6）で得られた染色後のパイル地のパイル糸の表層部に基布から繊維が浮き出た毛羽発生の有無を目視にて判定した。毛羽発生の無く、品位に優れたものを○、若干毛羽発生の認められるものを△、毛羽発生が著しく、品位が悪いものを×として評価した。

（8）タイルカーペットのパイル引抜き強さ

前記（6）で得られた染色後のパイル地の裏面に塩化ビ

ニル樹脂ペーストによりバッキングを施して得られたタイルカーペットを用いて、ＪＩＳ－Ｌ１０２３-1992 のパイル引抜き強さ試験のループパイルの場合に準じて測定を実施した。このパイル引抜き強さが、３．０kgf 以上を○、２．５～３．０kgf を△、２．５kgf 未満を×として評価した。

【００５１】（９）タイルカーペットの剛性

前記（６）で得られた染色後のパイル地の裏面に塩化ビニル樹脂ペーストによりバッキングを施して得られたタイルカーペットを用いて、ＪＩＳ　Ｌ－１９０６-1994 の剛軟度試験の４５° カンチレバー法に準じて測定を実施した。

【００５２】（１０）壁材の印刷性

長繊維不織布の表層にオフセットグラビア印刷方式で格子柄赤色単色刷りを行い、印刷性を目視にて判定した。印刷された線ににじみがなく、インクのりの良好なものを○、印刷された線に若干にじみが認められたものを△、印刷された線のにじみが著しいものを×として評価した。

【００５３】（１１）壁材の樹脂接着性

檜合板に酢酸ビニル樹脂エマルジョン（粘度　約２０００cps ）を塗布し、長繊維不織布の裏層面を貼り合わせ乾燥した後、長繊維不織布を剥がした際に樹脂層に残存する繊維付着状態を目視にて判定した。また、予め長繊維不織布の裏層に樹脂粘着層有するものについては、そのまま檜合板に貼り合わせて放置した後、長繊維不織布を剥がした際に樹脂に残存する繊維付着状態を目視にて判定した。

【００５４】長繊維不織布と樹脂接着層との界面が剥がれず、樹脂層と檜合板の界面で剥がれたものを◎、樹脂層に全面的に繊維付着したものを○、樹脂層に残存した繊維付着面積率が５０％以上であるものを△、樹脂層に残存した繊維付着面積率が５０％未満であるものを×として評価した。

【００５５】実施例１～３

前後に２層の繊維ウエブを噴射積層可能である紡糸・製布装置を用い、融点が２６２℃であるポリエチレンテレフタレートを高融点ポリマーに、融点が２２５℃であるイソフタル酸共重合ポリエステルを低融点ポリマーとし、２８５℃で溶融した後、紡糸装置には口金孔径０．５㎜φ、孔数３０ホールである高融点ポリマー繊維と低融点ポリマー繊維の混繊タイプの口金を多数配列し、長繊維ウエブの表層および裏層の高融点ポリマーと低融点ポリマーの重量比率が、それぞれ（１）表層８５：１５、裏層８５：１５、（２）表層８０：２０，裏層８５：１５，（３）表層８０：２０，裏層９０：１０となるように溶融ポリマーを押し出し冷却した後、単糸デニールが８デニールとなるようにエジェクターにて高速牽引し、鉛を主体とした衝突板により帯電、フィラメント束を開繊した後、移動するネットコンベア上に噴射、

４．３m幅で捕集した。引き続き圧着面積が１８％の一対のエンボスロールにより、ロール温度を長繊維ウエブ表層側ロール２３０℃、裏層側ロール２２０℃とし、線圧５０kg/cm で見掛密度が約０．２５g/cm³ となるように熱圧着した後、ジメチルポリシロキサンのエマルションをスプレーにて固形分で構成繊維に対して約2wt%付着させ１４０℃で２分間乾燥した後、幅４．２mとなるようにスリットし、表層の摩耗強さが３．０級以上、裏層の摩耗強さが３．０級以下である３種類のタフテッドカーペット用一次基布を作成した。

【００５６】引き続き、タフティングマシンを用いて、一次基布の裏層側からパイル糸（ナイロンＢＣＦ、２６００デニール、１６０フィラメント）を１／１０ゲージ、ステッチ１２本／インチ、パイル高さ３．５㎜、ループでパイル糸の植え込み幅が約４．１mとなるようにタフトし（一次基布の表層側がパイル側）、ループスチーマータイプの連続染色機により染色を行った後、ピンテンターで一次基布の端部を把持してパイル糸の植え込み幅が約４．１５mとなるように１３０℃で拡布乾燥した。さらに、エンドレスベルト上に下記塩化ビニルバッキング樹脂組成物（Ｘ）を厚さ１．３㎜で塗工、その上に目付４０g/m2 のガラス繊維不織布を含浸し、さらに下記塩化ビニルバッキング樹脂組成物（Ｙ）を厚さ１．３㎜で塗工し、その上部に約１００℃で予熱処理したパイル地（タフト後の一次基布）を積層し、エンドレスベルト側から塩化ビニルバッキング樹脂組成物を１７５℃で加熱処理した後、冷却し、５０cm角に裁断してタイルカーペットを作成した。

【００５７】＜塩化ビニルバッキング樹脂組成物（Ｘ）＞

塩化ビニルペースト	１００重量部
ジオクチルフタレート	９０重量部
炭酸カルシュウム	３５０重量部
カーボントナー	２重量部

＜塩化ビニルバッキング樹脂組成物（Ｙ）＞

塩化ビニルペースト	１００重量部
ジオクチルフタレート	９５重量部
炭酸カルシュウム	３００重量部
カーボントナー	２重量部

実施例４

長繊維ウエブの表層に用いる低融点ポリマーを融点が１９４℃のアジピン酸共重合ポリエステル、裏層に用いる低融点ポリマーを融点が２２５℃であるイソフタル酸共重合ポリエステルとし、表層、裏層とも高融点ポリマーと低融点ポリマーの重量比率が８５：１５、エンボスロール温度が表裏層側ロールとも２２０℃としたこと以外は、実施例１と同様の条件で、タフテッドカーペット用一次基布およびタイルカーペットを作成した。

【００５８】実施例５

長繊維ウエブの表層の単繊維の繊度が５デニール、裏層

の単繊維の繊度が１０デニールであること以外は、実施例１と同様の条件で、タフテッドカーペット用一次基布およびタイルカーペットを作成した。

【００５９】実施例６～７

前後に２層の繊維ウエブを噴射積層可能である紡糸・製布装置を用い、融点が２６２℃であるポリエチレンテレフタレートを高融点ポリマーに、融点が２２５℃であるイソフタル酸共重合ポリエステルを低融点ポリマーとし、２８５℃で溶融した後、前列（裏層）の紡糸装置には口金孔径０．５㎜φ、孔数３０ホールである高融点ポリマー繊維と低融点ポリマー繊維の混繊タイプの口金を多数配列し、高融点ポリマーと低融点ポリマーの重量比率が８５：１５となるように、また後列（表層）の紡糸装置には口金孔径０．５㎜φ、孔数３０ホールである高融点ポリマーが芯側、低融点ポリマーが鞘側である芯鞘複合タイプの口金を多数配列し、高融点ポリマーと低融点ポリマーの重量比率が８０：２０となるように溶融ポリマーを押し出し冷却した後、単糸デニールが８デニールとなるようにエジェクターにて高速牽引し、鉛を主体とした衝突板により帯電、フィラメント束を開繊した後、表層の芯鞘型複合繊維層と裏層の混繊繊維層の目付比率が（１）３０：７０、（２）５０：５０となるように移動するネットコンベア上に噴射、４．３m幅で捕集した。

【００６０】引き続き圧着面積が１８％の一対のエンボスロールにより、ロール温度を表裏層側ロールとも２２０℃とし、線圧５０kg/cm で見掛密度が約０．２５g/cm^3 となるように熱圧着した後、ジメチルポリシロキサンのエマルションをスプレーにて固形分で構成繊維に対して約２wt％付着させ１４０℃で２分間乾燥した後、幅４．２mとなるようにスリットし、表層の摩耗強さが３．０級以上、裏層の摩耗強さが３．０級以下である２種類のタフテッドカーペット用一次基布を作成した。

【００６１】ひき続き、実施例１と同様の方法により、タイルカーペットを作成した。

【００６２】実施例８

実施例６の芯鞘型複合繊維層と混繊層の積層ウエブを針密度１００回／cm^2 で芯鞘型複合繊維層側からニードルパンチした後に、エンボスロールで熱圧着すること以外は、実施例６と同様の条件でタフテッドカーペット用一次基布およびタイルカーペットを作成した。

【００６３】実施例９

一対のエンボスロールのロール温度を長繊維ウエブ表裏層側ロールとも２１０℃として熱圧着した後、エチレン－酢酸ビニル共重合樹脂エマルジョン中に含浸させ、熱風乾燥機を用いて表層側からのみ１６０℃の熱風を送り、表層側にエチレン－酢酸ビニル共重合樹脂をマイグレーションさせ、長繊維ウエブに対する樹脂の付着量を１０wt％としたこと以外は、実施例１と同様の条件で、タフテッドカーペット用一次基布およびタイルカーペットを作成した。

【００６４】比較例１

表裏層とも高融点ポリマーと低融点ポリマーの重量比率が７５：２５、エンボスロール温度が表裏層側ロールとも２３５℃としたこと以外は、実施例１と同様の条件で、タフテッドカーペット用一次基布およびタイルカーペットを作成した。

【００６５】このときの、タフテッドカーペット用一次基布の摩耗強さは、表裏層とも４．５級であった。

【００６６】比較例２

表裏層とも高融点ポリマーと低融点ポリマーの重量比率が９５：５、エンボスロール温度が表裏層側ロールとも２２０℃としたこと以外は、実施例１と同様の条件で、タフテッドカーペット用一次基布およびタイルカーペットを作成した。このときの、タフテッドカーペット用一次基布の摩耗強さは、表裏層とも２．０級であった。

【００６７】比較例３

実施例１において、表裏層側とも紡糸装置には口金孔径０．５㎜φ、孔数３０ホールである高融点ポリマーが芯側、低融点ポリマーが鞘側である芯鞘複合タイプの口金を多数配列し、高融点ポリマーと低融点ポリマーの重量比率を８０：２０とし、エンボスロール温度が表裏層側ロールとも２３０℃としてこと以外は、実施例１と同様の条件で、タフテッドカーペット用一次基布およびタイルカーペットを作成した。このときの、タフテッドカーペット用一次基布の摩耗強さは、表裏層とも４．０級であった。

【００６８】実施例１～９および比較例１～３のタフテッドカーペット用一次基布の特性を表１～２に、加工性およびタイルカーペットの特性について表３～４に示した。

【表１】

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		実施例							
		1	2	3	4	5	6	7	8
低融点ポリマーの複合形態	表層	混繊	混繊	混繊	混繊	混繊	芯鞘	芯鞘	芯鞘
	裏層	混繊	混繊	混繊	混繊	混繊	混繊	混繊	混繊
低融点ポリマーの比率（%）	表層	15	20	20	15	15	20	20	20
	裏層	15	15	10	15	15	15	15	15
低融点ポリマーの融点（℃）	表層	225	225	225	194	225	225	225	225
	裏層	225	225	225	225	225	225	225	225
単糸繊度（デニール）	表層	8	8	8	8	5	8	8	8
	裏層	8	8	8	8	10	8	8	8
表裏層の目付比率（%）	表層	50	50	50	50	50	30	50	30
	裏層	50	50	50	50	50	70	50	70
エンボスロール温度（℃）	表層	230	230	230	220	230	220	220	220
	裏層	220	220	220	220	230	220	220	220
ニードルパンチ処理の有無		無	無	無	無	無	無	無	有
一次基布（不織布）特性									
目付（g/㎡）		100	99	99	101	100	99	102	100
見掛密度（g/cm³）		0.26	0.24	0.25	0.21	0.27	0.26	0.30	0.18
引張強力（kgf/5cm）	タテ	22	28	26	30	25	29	32	35
	ヨコ	15	17	15	17	15	16	20	24
摩耗強さ（級）	表層	3.0	3.5	3.5	4.0	3.5	4.0	4.0	3.5
	裏層	2.5	2.5	2.0	2.5	2.0	2.5	2.5	1.5

【表2】

		比較例		
		1	2	3
低融点ポリマーの複合形態	表層	混繊	混繊	芯鞘
	裏層	混繊	混繊	芯鞘
低融点ポリマーの比率（%）	表層	25	5	20
	裏層	25	5	20
低融点ポリマーの融点（℃）	表層	225	225	225
	裏層	225	225	225
単糸繊度（デニール）	表層	8	8	8
	裏層	8	8	8
表裏層の目付比率（%）	表層	50	50	50
	裏層	50	50	50
エンボスロール温度（℃）	表層	235	220	230
	裏層	235	220	230
ニードルパンチ処理の有無		無	無	無
一次基布（不織布）特性				
目付（g/㎡）		101	99	100
見掛密度（g/cm³）		0.41	0.19	0.32
引張強力（kgf/5cm）	タテ	40	15	37
	ヨコ	26	8	20
摩耗強さ（級）	表層	4.5	2.0	4.0
	裏層	4.5	2.0	4.0

＊【表3】

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		実施例								
		1	2	3	4	5	6	7	8	9
タフトニードル の基布貫通抵抗値（kgf）		○	○	○	○	○	○	△	○	△
パイル地の引張強力 (kgf/5cm)	タ テ	35	34	31	30	29	32	27	39	37
	ヨ コ	21	20	19	17	18	18	16	26	22
連続染色時の寸法安定性		○	○	○	○	○	○	○	△	○
カーペットの表面品位		○	○	○	○	○	○	○	○	○
タイルカーペット パイル引抜き強さ(kgf)		○	○	○	○	○	○	○	○	○
タイルカーペット ヨコ方向剛軟度（mm）		255	260	247	273	253	256	269	267	271

【表4】

		比較例		
		1	2	3
タフトニードル の基布貫通抵抗値（kgf）		×	○	×
パイル地の引張強力 (kgf/5cm)	タ テ	22	29	24
	ヨ コ	11	15	9
連続染色時の寸法安定性		△	×	△
カーペットの表面品位		○	×	○
タイルカーペット パイル引抜き強さ(kgf)		×	○	×
タイルカーペット ヨコ方向剛軟度（mm）		280	217	269

以上、表3、表4に示すとおり、実施例1～9のタフテッドカーペット用一次基布は、特に表層の摩耗強さを3級以上、裏層を摩耗強さを3級以下としたものは、比較例1～3と比較してタフテッドカーペット加工に必要な特性であるタフト時の基布貫通抵抗値、パイル地の強力、連続染色時の寸法安定性いずれにも優れたものであり、更に本発明の一次基布を用いたタフテッドカーペット（タイルカーペット）は、パイル表面品位およびパイル引抜き強さなどの耐久性、剛性にも優れたものであった。

【0069】実施例10～12

前後に2層の繊維ウエブを噴射積層可能である紡糸・製布装置を用い、融点が262℃であるポリエチレンテレフタレートを高融点ポリマーに、融点が225℃であるイソフタル酸共重合ポリエステルを低融点ポリマーとし、285℃で溶融した後、紡糸装置には口金孔径0.5mmφ、孔数30ホールである高融点ポリマー繊維と低融点ポリマー繊維の混繊タイプの口金を多数配列し、長繊維ウエブの表層および裏層の高融点ポリマーと低融点ポリマーの重量比率がそれぞれ（1）表層85：15、＊裏層85：15、（2）表層80：20、裏層85：15，（3）表層80：20、裏層90：10となるように溶融ポリマーを押し出し冷却した後、単糸デニールが2デニールとなるようにエジェクターにて高速牽引し、鉛を主体とした衝突板により帯電、フィラメント束を開繊した後、移動するネットコンベア上に噴射、4．3m幅で捕集した。引き続き圧着面積が18%の一対のエンボスロールにより、ロール温度を長繊維ウエブ表層側ロール235℃、裏層側ロール220℃とし、線圧60kg/cm で見掛密度が約0．4g/cm³ となるように熱圧着して、表層の摩耗強さが3．0級以上、裏層の摩耗強さが3．0級以下である3種類の壁材を作成した。

【0070】実施例13

長繊維ウエブの表層に用いる低融点ポリマーを融点が194℃のアジピン酸共重合ポリエステル、裏層に用いる低融点ポリマーを融点が225℃であるイソフタル酸共重合ポリエステルとし、表層、裏層とも高融点ポリマーと低融点ポリマーの重量比率が80：20、エンボスロール温度が表裏層側ロールとも220℃としたこと以外は、実施例10と同様の条件で、壁材を作成した。

【0071】実施例14

長繊維ウエブの表層の単繊維の繊度が1デニール、裏層の単繊維の繊度が5デニールであること以外は、実施例10と同様の条件で、壁材を作成した。

【0072】実施例15～16

前後に2層の繊維ウエブを噴射積層可能である紡糸・製布装置を用い、融点が262℃であるポリエチレンテレフタレートを高融点ポリマーに、融点が225℃であるイソフタル酸共重合ポリエステルを低融点ポリマーとし、285℃で溶融した後、前列（裏層）の紡糸装置には口金孔径0．5mmφ、孔数30ホールである高融点ポリマー繊維と低融点ポリマー繊維の混繊タイプの口金を

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多数配列し、高融点ポリマーと低融点ポリマーの重量比率が85：15となるように、また後列（表層）の紡糸装置には口金孔径0．5㎜φ、孔数30ホールである高融点ポリマーが芯側、低融点ポリマーが鞘側である芯鞘複合タイプの口金を多数配列し、高融点ポリマーと低融点ポリマーの重量比率を70：30となるように溶融ポリマーを押し出し冷却した後、単糸デニールが2デニールとなるようにエジェクターにて高速牽引し、鉛を主体とした衝突板により帯電、フィラメント束を開繊した後、表層の芯鞘型複合繊維層と裏層の混繊繊維層の目付比率が（1）50：50、（2）80：20となるように移動するネットコンベア上に噴射、4．3m幅で捕集した。引き続き圧着面積が18%の一対のエンボスロールにより、ロール温度を表裏層側ロールとも220℃とし、線圧60kg/cm で見掛密度が約0．4g/cm³ となるように熱圧着して、表層の摩耗強さが3．0級以上、裏層の摩耗強さが3．0級以下である2種類の壁材を作成した。

【0073】実施例17

一対のエンボスロールのロール温度を長繊維ウエブ表裏層側ロールとも215℃として熱圧着した後、アクリル酸エステル樹脂エマルジョン中に含浸させ、熱風乾燥機を用いて表層側からのみ160℃の熱風を送り、表層側にアクリル酸エステル樹脂をマイグレーションさせ、長繊維ウエブに対する樹脂の付着量を15%としたこと以外は、実施例10と同様の条件で、壁材を作成した。

【0074】実施例18

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＊実施例14の壁材の裏層側に、厚さ0．5㎜の樹脂粘着層を設けた壁材を作成した。

【0075】比較例4

表裏層とも高融点ポリマーと低融点ポリマーの重量比率が75：25、エンボスロール温度が表裏層側ロールとも235℃としたこと以外は、実施例10と同様の条件で、壁材を作成した。このときの摩耗強さは、表裏層とも4．5級であった。

【0076】比較例5

表裏層とも高融点ポリマーと低融点ポリマーの重量比率が95：5、エンボスロール温度が表裏層側ロールとも220℃としたこと以外は、実施例10と同様の条件で、壁材を作成した。このときの摩耗強さは、表裏層とも2．5級であった。

【0077】比較例6

実施例10において、表裏層側とも紡糸装置には口金孔径0．5㎜φ、孔数30ホールである高融点ポリマーが芯側、低融点ポリマーが鞘側である芯鞘複合タイプの口金を多数配列し、高融点ポリマーと低融点ポリマーの重量比率を70：30とし、エンボスロール温度が表裏層側ロールとも230℃としてこと以外は、実施例10と同様の条件で、壁材を作成した。このときの摩耗強さは、表裏層とも5．0級であった。

【0078】実施例10～19および比較例4～6の壁材の特性を表5～6に示した。

【0079】

＊　【表5】

		実施例								
		10	11	12	13	14	15	16	17	18
低融点ポリマーの複合形態	表層	混繊	混繊	混繊	混繊	混繊	芯鞘	芯鞘	混繊	混繊
	裏層	混繊	混繊	混繊	混繊	混繊	混繊	混繊	混繊	混繊
低融点ポリマーの比率（%）	表層	15	20	20	20	15	30	30	15	15
	裏層	15	15	10	20	15	15	15	15	15
低融点ポリマーの融点（℃）	表層	225	225	225	194	225	225	225	225	225
	裏層	225	225	225	225	225	225	225	225	225
単糸繊度（デニール）	表層	2	2	2	2	1	2	2	2	1
	裏層	2	2	2	2	5	2	2	2	5
表裏層の目付比率（%）	表層	50	50	50	50	50	50	80	50	50
	裏層	50	50	50	50	50	50	20	50	50
エンボスロール温度（℃）	表層	235	235	235	220	235	220	220	215	235
	裏層	220	220	220	220	220	220	220	215	220
ニードルパンチ処理の有無		無	無	無	無	無	無	無	無	無
樹脂バインダー付与の有無		無	無	無	無	無	無	無	有	無
樹脂粘着層の有無		無	無	無	無	無	無	無	無	有
壁材特性 目付（g/㎡）		80	80	81	79	80	80	80	91	80
壁材特性 見掛密度（g/cm³）		0.41	0.42	0.40	0.43	0.38	0.40	0.42	0.45	0.38
壁材特性 摩耗強さ（級）	表層	4.0	4.0	4.0	4.5	5.0	4.5	4.5	5.0	5.0
	裏層	2.5	2.5	2.0	2.5	2.0	2.5	3.0	3.0	2.0
壁材特性 印刷性		△	○	○	○	○	○	○	○	○
壁材特性 樹脂接着性		○	○	○	○	○	○	△	△	◎

【表6】

		比較例		
		4	5	6
低融点ポリマーの複合形態	表層	混繊	混繊	芯鞘
	裏層	混繊	混繊	芯鞘
低融点ポリマーの比率（%）	表層	25	5	30
	裏層	25	5	30
低融点ポリマーの融点（℃）	表層	225	225	225
	裏層	225	225	225
単糸繊度（デニール）	表層	2	2	2
	裏層	2	2	2
表裏層の目付比率（%）	表層	50	50	50
	裏層	50	50	50
エンボスロール温度（℃）	表層	235	220	230
	裏層	235	220	230
ニードルパンチ処理の有無		無	無	無
樹脂バインダー付与の有無		無	無	無
樹脂粘着層の有無		無	無	無
壁材特性 目付（g/㎡）		80	80	79
壁材特性 見掛密度（g/cm³）		0.58	0.19	0.53
壁材特性 摩耗強さ（級）	表層	4.5	2.5	5.0
	裏層	4.5	2.5	5.0
壁材特性 印刷性		○	×	○
壁材特性 樹脂接着性		×	○	×

表5、表6に示す通り、実施例10～19の壁材は、特に表層の摩耗強さを3級以上、裏層を摩耗強さを3級以下としたものは、比較例4～6と比較して表面の印刷特性と樹脂接着性ともに優れたものであった。

【0080】

【発明の効果】本発明の不織布、特にカーペット用一次基布、たとえばタフテッドカーペット用一次基布は、タフト加工性、染色加工性や寸法安定性などカーペット製造時の全ての工程において満足すべき加工性を得る性能をバランス良く有し、この基布を使用したカーペットは、パイル表面品位やパイル糸引抜き強さなどの耐久性、剛性などの性能にも優れる効果を有するものであり、また壁材は、表面の印刷特性と樹脂接着性ともに優れる効果を有するものである。

フロントページの続き

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METHOD OF PRODUCING TUFTED PILE FABRIC AND NONWOVEN BACKING FABRIC FOR THE SAME

Original Filed Nov. 7, 1966 2 Sheets-Sheet 1

Fig. 1.

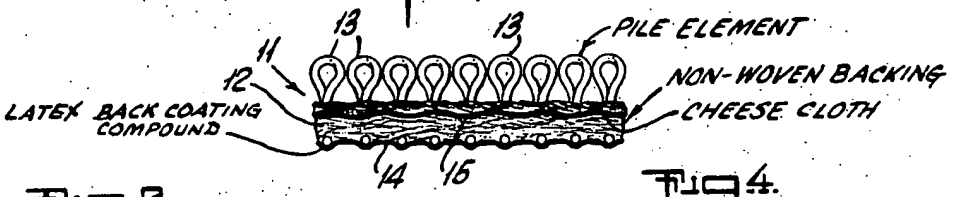


Fig. 2.

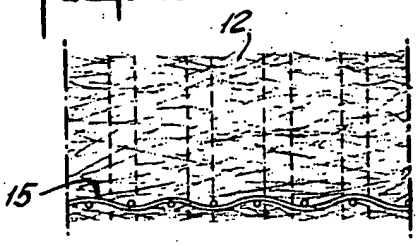


Fig. 4.

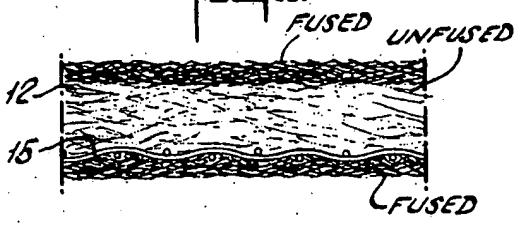


Fig. 3.

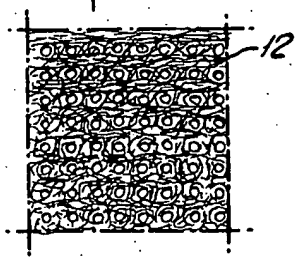


Fig. 5.

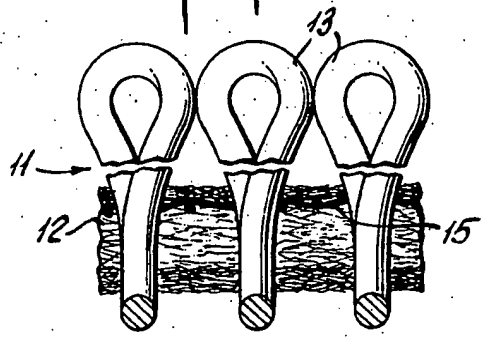


Fig. 7.

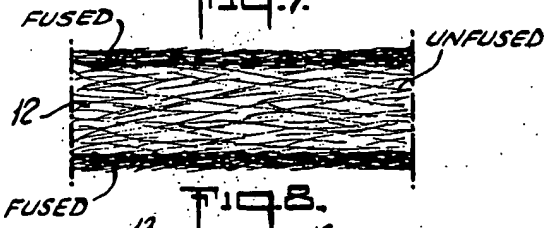


Fig. 6.

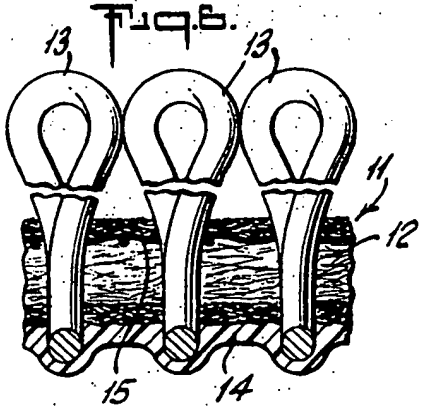
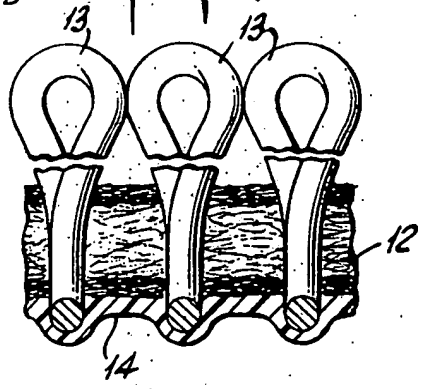


Fig. 8.



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Oct. 20, 1970 D. B. PARLIN ET AL 3,535,178

METHOD OF PRODUCING TUFTED PILE FABRIC AND NONWOVEN BACKING FABRIC FOR THE SAME

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FIG. 9.

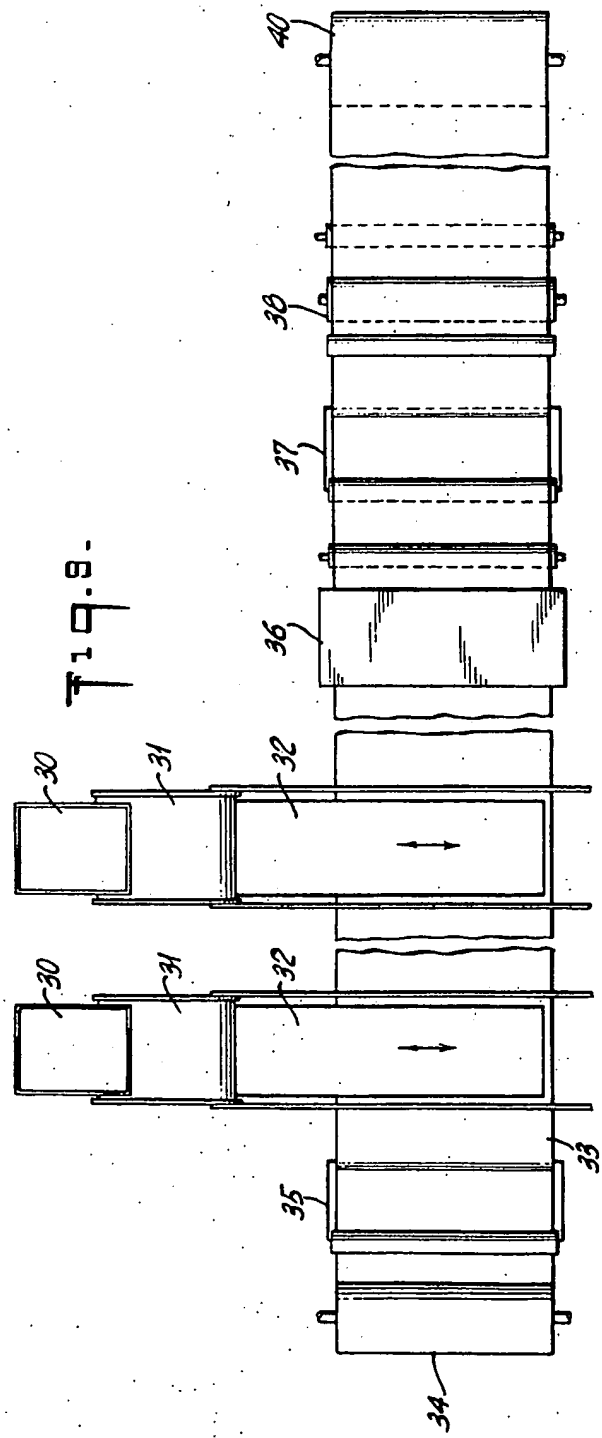
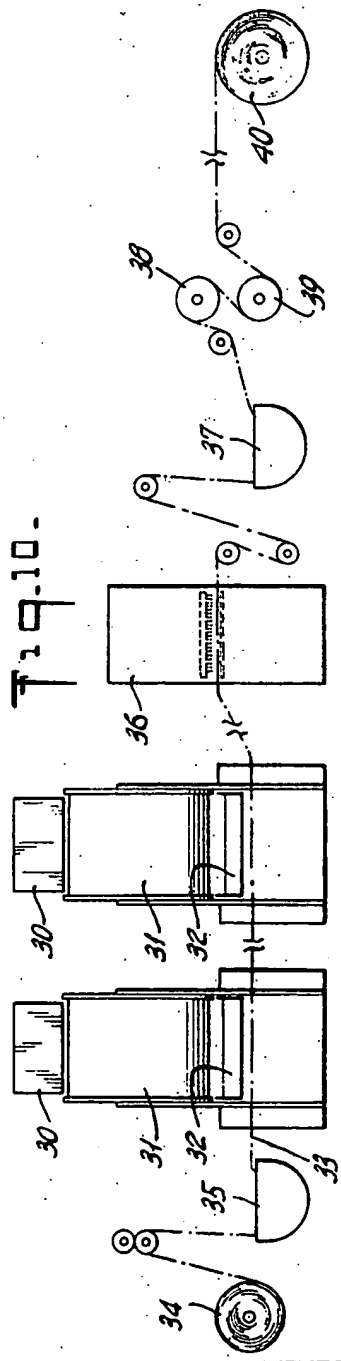


FIG. 10.



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METHOD OF PRODUCING TUFTED PILE FABRIC AND NONWOVEN BACKING FABRIC FOR THE SAME

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Int. Cl. D05c 15/00
U.S. Cl. 156—72 20 Claims

ABSTRACT OF THE DISCLOSURE

A layer of thermoplastic fibers is distributed on a thin, flexible, sheet-like carrier and needled thereto, portions of the fibers being forced through the layer and the carrier to form a web. The fibers at at least one surface of the web are bonded, as by fusion, to each other while the fiber portions in the interior of the web remain unbonded. The fibers may additionally be bonded to the carrier, or fibers on both surfaces of the web may be bonded. The web may then be tufted to form a carpet.

This application is a division of copending application Ser. No. 595,304 filed Nov. 7, 1966, now Pat. No. 3,394,-043 and is a continuation-in-part of our copending appication Ser. No. 320,276 filed Oct. 31, 1963, now abandoned:

The present invention relates to improvements in tufted pile fabrics such as carpet and to the method of producing the same. It relates, more particularly, to tufted carpet in which the pile elements are formed and supported on a novel backing fabric comprised principally of nonwoven fibers and the method of producing the same. The present application also relates to improvements in the backing fabric for tufted carpet or the like and the method of producing such fabric.

An object of the present invention is to provide a tufted carpet having a backing fabric comprised principally of non-woven fibers which imparts superior qualities to the carpet in a number of respects including the cost, weight, strength, dimensional stability, handle, availability of materials and the like, particularly in comparison to conventional tufted carpet which uses a loosely woven burlap or similar material as the backing fabric.

Another object of the present invention is to provide a backing fabric for tufted carpet which can be produced at a relatively high rate of productivity from inexpensive materials which are readily available in most countries, including the United States. This eliminates problems of long delays and uncertainties of delivery which are frequently encountered in obtaining the commonly used loosely woven burlaps which are usually manufactured from jute in countries such as India.

In addition a backing fabric in accordance with the present invention has a consistent uniformity in composition which practically eliminates irregularities or imperfections in the appearance of the pile face of the tufted carpet due to needle deflection which can occur when a tufting needle strikes a woven strand of jute or similar material. The nonwoven fibers of the subject backing fabric also provides for better closure on the pile forming yarns after tufing than do the strands of loosely woven materials such as burlap. The subject backing fabric also has a greater ability to pick up the adhesive back coating which holds the pile forming yarns in place without objectionable penetration of the back coating on the face of the fabric.

In addition, tufted carpet embodying the present invention is lighter in weight than tufted carpet having comparable tufts or pile which use burlap as the backing fabric, with the result that shipping costs are reduced and larger rolls of carpet can be handled.

Various other objects and advantages of the present invention will become apparent and will be better understood from the following description and the accompanying drawings in which:

FIG. 1 is a side elevational view in vertical section in a warpwise direction diagrammatically illustrating a piece of tufted carpet embodying the present invention;

FIG. 2 is a side elevational view in vertical section in a warpwise direction diagrammatically illustrating the backing fabric of the tufted carpet shown in FIG. 1 but on an enlarged scale and in the form of a needled bat prior to surface treatment thereof;

FIG. 3 is a plan view diagrammatically illustrating the backing fabric shown in FIG. 2;

FIG. 4 is a side elevational view in vertical section in a warpwise direction diagrammatically illustrating the backing fabric shown in FIG. 2 after surface treatment;

FIG. 5 is a side elevational view in vertical section in a warpwise direction diagrammatically illustrating the backing fabric shown in FIG. 4 with yarns forming pile elements tufted thereon;

FIG. 6 is a fragmentary view of the tufted carpet shown in FIG. 1, but on an enlarged scale;

FIG. 7 is a side elevational view in vertical section in a warpwise direction diagrammatically illustrating a modification of the backing fabric shown in FIGS. 2–6;

FIG. 8 is a side elevational view in vertical section in a warpwise direction diagrammatically illustrating a piece of tufted pile carpet with the modified form of backing fabric shown in FIG. 7;

FIG. 9 is a plan view diagrammatically illustrating the apparatus and procedure employed for producing the backing fabric shown in FIG. 4;

FIG. 10 is a side elevation of the apparatus and procedure illustrated in FIG. 9.

It will be understood that the accompanying drawings are merely diagrammatic illustrations and that reference should be made to the following description for a more detailed explanation of the structures involved. Also, it will be understood that the backing fabric will be comprised principally of nonwoven fibers and hence, may be referred to as a nonwoven fabric. When used as the support element in tufted carpet, the thickness of the backing fabric will be of the same relative order as a woven burlap and may be readily substituted therefor.

Generally speaking, a tufted pile fabric such as carpet made in accordance with the present invention employs a novel backing fabric comprised principally of nonwoven fibers as the element on which yarns forming the pile elements are tufted and supported. Prior to tufting, the backing fabric is in the form of a bat of filaments or fibers of synthetic thermoplastic material of high strength, particularly polypropylene and the fibers employed by be those termed "waste" fibers in the trade. The backing fabric may be formed by distributing the fibers at random by means of garnets in one or more superimposed layers on a carrier such as a low-count cotton cheesecloth. The cheesecloth with the fibers deposited thereon is then moved to a needling machine where the web is subjected to a needling operation which causes the fibers to be intimately intertwined and interengaged with each other throughout the thickness of the web, particularly at the points of needling. After needling, fibers on one or both exterior surfaces of the bat are bonded together to a flattened and hardened condition with the interior fibers remaining unbonded. This may be done by heating the surface fibers to their

melting temperature so as to fuse the surface fibers without fusing the fibers on the interior of the web. The bonding or fusing of the fibers on exterior surfaces of the web tends to increase the tensile strength of the web and the bonded or fused surface can pass beneath the needles of tufting machines during the tufting operation without excessive interference or objectionable drag.

The usual tufting machines are employed in forming the pile elements and the tufting needles which carry the tufting yarns penetrate the backing fabric from the rear face thereof so as to form loops of the yarns having a desired length or height which extend from the opposite or front face of the backing fabric. The needles are then withdrawn from the backing fabric with the yarn loops being held in place while the backing fabric which has been tufted is advanced for the tufting of the next row of pile elements thereon.

It should be noted here that passage of the yarn-carrying needles through the backing fabric which takes place in the tufting has the effect of compacting the filaments or fibers of the nonwoven fabric in the area surrounding the pile yarns and this tends to increase the tensile strength of the backing fabric even though the tufting needles penetrate or puncture the fabric at closely spaced intervals.

After the formation of the tufted pile elements has been completed, a suitable adhesive back-coating compound, such as a high solids synthetic latex adhesive compound of the type usually used as a back-coating for tufted pile carpet, is applied to the rear face or back of the carpet. The back-coating penetrates the backing fabric to some extent and it secures the portions of the pile yarns extending along and through the backing fabric to the backing fabric.

Referring now to the drawings, FIG. 1 illustrates a tufted pile fabric **11** of a type suitable for use as a floor covering or carpet which may hereinafter be called tufted carpet or tufted pile carpet. However, it will be understood that the present invention is not necessarily limited to tufted pile fabrics for use as floor coverings, although it has particular advantages for such use.

As shown in FIGS. 1 and 6, the tufted pile carpet **11** comprises a backing fabric **12** comprised principally of nonwoven fibers which has several rows of tufted pile elements **13** in the form of loops of yarn supported thereon. The yarns forming the pile elements are stitched to the nonwoven backing by means of a tufting machine of a type customarily employed for such purpose and hence, the tufting operation need not be described in detail here. In addition, there is a coating **14** of an adhesive compound, such as a synthetic latex based compound, on the back or rear face of the nonwoven backing fabric which secures portions of the yarns forming the pile elements to the backing fabric in such a way that the yarns will not unravel readily or be pulled from the carpet under ordinary use.

The backing or supporting fabric **12** is comprised principally of fibers of thermoplastic material, preferably polypropylene or other polyolefins having similar characteristics including mixtures. The fibers are distributed at random and are needled into the form of a cohesive bat or web. The needling causes fibers from different levels of the bat to be intermixed in more intimate engagement with each other and imparts strength to the bat or web. A closed barb needle of small diameter, such as a #32 fine felt triple barb needle, may be employed for this purpose.

As shown in FIGS. 1–6, the needled web of nonwoven fibers includes a piece of low-count cheesecloth **15** of cotton or other suitable material extending therethrough. As shown in FIGS. 9 and 10, the fibers are deposited on a moving web of the cheesecloth and the fibers carried by the cheesecloth are then subjected to a needling operation. When the procedure illustrated is followed, the cheesecloth is incorporated in the needled web at a point adjacent its lower surface.

If desired, other means, such as a continuous moving belt or slats or the like may be employed to support and transport layers of fibers to needling operation. In such case, the cheesecloth may then be eliminated. A modified form of the backing or support fabric without the cheesecloth is shown in FIG. 7 and the same reference numerals have been applied to corresponding elements. This form of backing fabric after tufting and back coating is also shown in FIG. 8.

It will be noted that in a tufted fabric, such as tufted carpet, double thicknesses of the pile-forming yarns extend through the backing fabric at closely spaced intervals both across and lengthwise of the fabric and the double portions of the pile forming yarns exert lateral forces on the fabric. Although such forces are of a low order, the cumulative effect of such forces, particularly in a twelve to fifteen foot width of the tufted carpet, will cause the tufted fabric to grow or expand in both its widh and lengh when the backing fabric is formed from fibers having elastic properties, such as polypropylene.

Such growth takes place gradually and may not be uniform, particularly in instances of carpet where different pile yarns are used. Hence, the growth is likely to give rise to difficulties in subsequent manufacturing operations. However, this problem is overcome to a large extent by incorporation of the cheesecloth in the backing fabric as shown in FIGS. 9 and 10 as the threads of the cheesecloth will resist such forces.

When the fibers are deposited on the cheesecloth as shown in FIGS. 9 and 10 with the cheesecloth being adjacent the lower face of the web, the ends of some fibers are forced through the open mesh of the cheesecloth. This is called the beard side of the fabric. Thereafter, when the surface fibers on the beard side of the fabric are fused or bonded together, they also engage with and grip the threads of the cheesecloth and thus, prevent slippage or movement of the cheesecloth relative to the web of needled fibers. Under these conditions the fused fibers and the threads of the cheesecloth combine to resist and overcome the forces exerted on the backing fabric as a result of tufting and permit the desired dimensions to be maintained. When the fabric is tufted, it is preferable that the cheesecloth or the like be adjacent the upper or pile face of the carpet as shown in FIGS. 1 and 6.

The backing or support fabric may be made entirely from polypropylene fibers or from mixtures of polypropylene fibers with fibers of other materials such as nylon, rayon, acrylic, polyester or mixtures thereof. Polypropylene fibers have been found to have especially suitable characteristics particularly for use in conjunction with tufted carpet and are readily available in good supply and at low cost in most countries, including the United States. A satisfactory backing or support fabric for tufted carpet may be made from polypropylene fibers of 5 to 15 denier which are commonly produced commercially. If desired, fibers of different denier may be mixed.

In addition, fibers of other materials may be included in the mixture and the following is an example of a suitable mixture of fibers which may be employed in a backing fabric for tufted carpet: Polypropylene fibers (4½ in. staple)—90% (75%—6 denier; 25%—3 denier) and Rayon fibers (3 in. staple)—10%.

The rayon fibers in this mixture serve primarily as dye sites in the backing fabric so that its color will approximate the color of the pile yarns after dyeing. The content of rayon fibers may be increased to some extent, but it should not be increased to a point where substantial weakening of the backing fabric takes place.

In the above mixture of 3- and 6-denier polypropylene fibers, the 3-denier fibers will fill any voids or spaces between the larger 6-denier fibers and changes in these proportions can be made as desired.

As is customary, the polypropylene fibers are crimped and the crimp imparted by usual procedure employed in the United States; i.e., by overfeeding the filaments

as they are fed into a heated stuffing box, is satisfactory.

The bonding or fusing of the surface fibers also flattens upstanding fibers and provides a somewhat harder and smoother surface which will pass more readily beneath the needles of the tufting machine.

In the case of polypropylene fibers, the polypropylene fibers on the surface of the web may be bonded together by heating these fibers to a temperature slightly above their melting point for a short period of time so as to fuse the surface fibers without affecting the interior or remaining fibers of the web.

As noted above, the tufting needles penetrate the backing fabric repeatedly at closely spaced intervals in the tufting operation and in effect, form punctures or openings therein through which the double thickness of the pile yarns extend. With a conventional backing fabric, such as burlap, needle punctures which occur in the tufting tend to weaken the fabric. This is particularly true with woven fabrics such as burlap where strands of the backing fabric may be severed by the needles if proper care is not exercised. However, the tensile strength of a backing fabric embodying the subject invention is not appreciably reduced or diminished by the tufting and an increase in the overall tensile strength of the tufted pile fabric may result due to the compacting of the unbonded or unfused fibers in the interior center of the backing fabric in areas adjacent the points where the needles penetrate the fabric.

Tensile strength tests made of samples of nonwoven backing fabrics of several weights (8 oz., 6 oz., and 4 oz. fabrics) indicate that this is the case. In addition, the unbounded or unfused fibers which are compacted in areas surrounding the needle penetrations retain their resilient characteristics and thus, have a tendency to close on the portions of the pile forming yarns which extend through the backing fabric and to hold the pile yarns in place more effectively in the drawing of the loops than is the case with loosely woven backing fabrics such as burlap. Further, the backing fabric made in accordance with the subject invention will not fray.

A very distinct advantage of the backing fabric described herein over woven backings such as burlap is that no skewing of filling strands can take place and distortion in alignment of pile elements resulting therefrom is eliminated.

After the pile forming yarns have been tufted on the backing or support fabric, a suitable adhesive compound forming the back-coating **14** is applied to the rear face of the tufted backing fabric. The back-coating penetrates the backing fabric to some extent and it anchors the pile elements in place. A suitable back-coating compound for this purpose is a high solids synthetic latex base adhesive compound, such as is commonly used for tufted carpet.

In this connection, it should be noted that the backing or support fabric remains porous and the unbonded or unfused fibers on the interior thereof permit a considerable amount of the back-coating compound to be absorbed without having the compound penetrate to the pile face of the backing fabric. Thus, the hand of the tufted pile fabric can be varied by adjusting the amount of the adhesive compound applied thereto. Scrim or other suitable finish or covering materials may be applied, if desired, to the rear face of the tufted carept in the usual manner.

One way in which the backing or support fabric embodying the subject invention may be produced is illustrated schematically in FIGS. 9 and 10. Briefly, polypropylene fibers (or mixtures containing polypropylene fibers) are fed from feed boxes **30** onto garnets **31** which combine the fibers into layers which pass onto run-out chutes **32**. The run-out chutes traverse back and forth over a traveling conveyor or supporting element **33** which, as mentioned above, may be the low-count cheesecloth **15** and deposit the fiber layers thereon.

It is generally desirable to deposit more than one layer of the fibers on the conveyor element or cheesecloth so as to obtain a more even and uniform distribution of the fibers.

The conveyor element or cheesecloth is fed from a roll **34** through a J-box **35** from which it moves forward as a continuous web beneath the ends of the traversing run-out chutes to receive the fibers and thence, to a needling machine **36** carrying the layers of fibers deposited thereon with it. After leaving the needling machine, the needled web of fibers with the cheesecloth incorporated therein passes into another J-box **37** and then to a pair of heated rolls **38** and **39** which contact with the exterior surfaces of the needled web or bat.

In order to fuse fibers of polypropylene having a melting point of between 310° to 320° F., the surface fibers should be heated briefly to a temperature between 325° and 350° F. by contact with the rolls. When heated in this manner, the fibers in the center or interior of the web do not reach their melting temperature and will remain unbonded or unfused. When the fused fibers on the exterior surfaces of the web have been permitted to cool, the backing fabric may be then wound into a roll **40**.

The web may be run through a disc cutter to cut it to the desired width either before or after the surface treatment. Also, a suitable binder or solvent, such as an acrylic resin or a water resistant cure type latex may be sprayed on the surfaces of the web in liquid form and then dried to bind the surface fibers together in place of fusing them by heat.

The various pieces of apparatus mentioned above are conventional and hence need not be described in detail here.

It will be understood that various changes and modifications may be made by those skilled in the art in the particular embodiments of the tufted pile fabric and the method of producing the same which have been described above for illustrative purposes without departing from the scope of the invention as defined by the following claims.

We claim:

1. In a method of producing tufted carpet, the steps comprising:
   (a) depositing fibers on a web of textile threads;
   (b) then needling the fibers while supported on the web of textile threads into a cohesive sheet-like web;
   (c) bonding the fibers at at least one surface of the sheet-like web to each other and to the textile threads at said surface while leaving the fiber portions in the interior of the web in an unbonded state; and
   (d) then forming pile elements on the sheet-like web by tufting.

2. A method of producing tufted carpet as defined in claim 1 wherein:
   (a) a majority of the fibers deposited on the textile threads are polypropylene fibers; and
   (b) the polypropylene fibers which are bonded together as described in claim 1 are so bonded by heating those portions of said fibers at the one surface to a temperature above their melting point without similarly heating the remaining portions of the fibers in the interior of the web.

3. In a method of producing a backing fabric for tufted carpet, the steps which comprise:
   (a) depositing one or more layers of fibers on a web of cheesecloth having warp filling threads;
   (b) then needling the fibers throughout said layer into intimately intermixed relation relative to each other and into engagement with the threads of the cheesecloth;
   (c) and then bonding fibers on at least one exterior surface of the needled material to each other and to the threads of the cheesecloth while leaving the fiber portions in the interior of the web in an unbonded state.

4. In a method of producing a backing fabric for tufted carpet, the steps as defined in claim 3 wherein:
   (a) more than eighty percent (80%) of the fibers are of polypropylene; and

(b) the polypropylene fibers are bonded together and to the cheesecloth threads by fusing those portions of said fibers at the one exterior surface without fusing the remaining portions of the fibers in the interior of the web.

5. In a method of producing a non-woven fabric, the steps which comprise:

(a) depositing one or more layers of fibers on a supporting member;

(b) then needling the fibers throughout said layer into intimately intermixed relation relative to each other and into engagement with said member; and

(c) then bonding said fibers at at least one exterior surface of the needled layer to each other, while leaving the fiber portions in the interior of said layer in an unbonded state.

6. In a method of making a nonwoven fabric, the steps as defined in claim 5 wherein:

(a) said fibers are synthetic and of thermoplastic material and the bonding is accomplished by heating.

7. In a method of producing a nonwoven fabric, the steps which comprise:

(a) depositing a layer of fibers on a thin, sheet-like, flexible supporting member;

(b) then needling the fibers throughout said layer into intimately intermixed relation relative to each other, and into engagement with said member; and

(c) then bonding the fibers on at least one exterior surface of the needled layer into engagement with each other and with said member while at the same time leaving the fibers on the interior of said layer unbonded.

8. In a method of making a nonwoven fabric, the steps which comprise:

(a) depositing a layer of fibers, most of which are of synthetic thermoplastic material, on a sheet-like, flexible supporting member;

(b) needling said layer throughout its thickness at a multiplicity of closely spaced points extending over its surface area and thereby displacing vertically relative to the thickness of the layer at said points of needling portions of fibers from different levels of the layer; and

(c) heat bonding surface fibers and the supporting member together without bonding the interior fibers of said layer.

9. In a method of making a nonwoven fabric, the steps as defined in claim 6 wherein:

(a) said supporting member is a flexible moving sheet through which some of the needles and fibers are carried during said needling operation.

10. A method of producing a nonwoven fabric comprising the steps of:

(a) distributing a layer of fibers on a thin, flexible, sheet-like carrier;

(b) needling the layer of fibers and thereby entangling said fibers and forcing portions of said fibers through the carrier, thereby forming a needled web characterized by the presence of fibers at both web surfaces;

(c) bonding adjacent fiber portions at at least one surface of the web to each other while leaving those portions of the fibers adjacent the center of the web unbonded.

11. The method of claim 10 comprising bonding adjacent fiber portions at both surfaces of the web to each other while leaving those portions of the fibers adjacent the center of the web unbonded.

12. The method of claim 11 wherein the fibers are thermoplastic and the bonding is accomplished by heating the fiber portions to be bonded to their melting point, and thus fusing them, while maintaining the fiber portions adjacent the center of the web below their melting point.

13. The method of claim 10 wherein the fibers are thermoplastic and the bonding is accomplished by heating the fiber portions to be bonded to their melting point, and thus fusing them, while maintaining the fiber portions adjacent the center of the web below their melting point.

14. The method of claim 13 wherein the heating is accomplished by passing the web through the nip of a pair of rolls, one of said rolls being heated to a temperature above the melting point of the fibers.

15. The method of claim 13 wherein the heated and fused fibers are those which have been forced by needling through the carrier.

16. A method of making a tufted carpet comprising:

(a) depositing a layer of randomly oriented thermoplastic fibers on a thin, flexible, sheet-like carrier;

(b) forming a web by needling the fiber layer and thereby forcing portions of fibers from all parts of the layer down through the layer and through the carrier;

(c) fusing by heat portions of the fibers which have been forced through the carrier to each other while leaving those portions of the fibers which are located in the center of the web unfused;

(d) tufting the web with pile yarns.

17. The method of claim 16 comprising the step of applying an adhesive back coating to the rear face of the tufted fabric and thereby anchoring the yarn in place.

18. The method of claim 12 wherein the heating is accomplished by passing the web through the nip of a pair of rolls, both of which are heated above the melting point of the fibers.

19. A method of forming a nonwoven fabric comprising the steps of:

(a) depositing a layer of randomly oriented thermoplastic fibers on a thin, flexible, sheet-like carrier;

(b) forming a web by needling the fiber layer and thereby forcing portions of fibers from all parts of the layer down through the layer and through the carrier;

(c) fusing by heat portions of the fibers which have been forced through the carrier to each other while leaving those portions of the fibers which are located in the center of the web unfused.

20. The method of claim 15 wherein the fused fibers are heated and compressed against the carrier while in a melted state and are thereby fused to the carrier.

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melting temperature so as to fuse the surface fibers without fusing the fibers on the interior of the web. The bonding or fusing of the fibers on exterior surfaces of the web tends to increase the tensile strength of the web and the bonded or fused surface can pass beneath the needles of tufting machines during the tufting operation without excessive interference or objectionable drag.

The usual tufting machines are employed in forming the pile elements and the tufting needles which carry the tufting yarns penetrate the backing fabric from the rear face thereof so as to form loops of the yarns having a desired length or height which extend from the opposite or front face of the backing fabric. The needles are then withdrawn from the backing fabric with the yarn loops being held in place while the backing fabric which has been tufted is advanced for the tufting of the next row of pile elements thereon.

It should be noted here that passage of the yarn-carrying needles through the backing fabric which takes place in the tufting has the effect of compacting the filaments or fibers of the nonwoven fabric in the area surrounding the pile yarns and this tends to increase the tensile strength of the backing fabric even though the tufting needles penetrate or puncture the fabric at closely spaced intervals.

After the formation of the tufted pile elements has been completed, a suitable adhesive back-coating compound, such as a high solids synthetic latex adhesive compound of the type usually used as a back-coating for tufted pile carpet, is applied to the rear face or back of the carpet. The back-coating penetrates the backing fabric to some extent and it secures the portions of the pile yarns extending along and through the backing fabric to the backing fabric.

Referring now to the drawings, FIG. 1 illustrates a tufted pile fabric **11** of a type suitable for use as a floor covering or carpet which may hereinafter be called tufted carpet or tufted pile carpet. However, it will be understood that the present invention is not necessarily limited to tufted pile fabrics for use as floor coverings, although it has particular advantages for such use.

As shown in FIGS. 1 and 6, the tufted pile carpet **11** comprises a backing fabric **12** comprised principally of nonwoven fibers which has several rows of tufted pile elements **13** in the form of loops of yarn supported thereon. The yarns forming the pile elements are stitched to the nonwoven backing by means of a tufting machine of a type customarily employed for such purpose and hence, the tufting operation need not be described in detail here. In addition, there is a coating **14** of an adhesive compound, such as a synthetic latex based compound, on the back or rear face of the nonwoven backing fabric which secures portions of the yarns forming the pile elements to the backing fabric in such a way that the yarns will not unravel readily or be pulled from the carpet under ordinary use.

The backing or supporting fabric **12** is comprised principally of fibers of thermoplastic material, preferably polypropylene or other polyolefins having similar characteristics including mixtures. The fibers are distributed at random and are needled into the form of a cohesive bat or web. The needling causes fibers from different levels of the bat to be intermixed in more intimate engagement with each other and imparts strength to the bat or web. A closed barb needle of small diameter, such as a #32 fine felt triple barb needle, may be employed for this purpose.

As shown in FIGS. 1–6, the needled web of nonwoven fibers includes a piece of low-count cheesecloth **15** of cotton or other suitable material extending therethrough. As shown in FIGS. 9 and 10, the fibers are deposited on a moving web of the cheesecloth and the fibers carried by the cheesecloth are then subjected to a needling operation. When the procedure illustrated is followed, the cheesecloth is incorporated in the needled web at a point adjacent its lower surface.

If desired, other means, such as a continuous moving belt or slats or the like may be employed to support and transport layers of fibers to needling operation. In such case, the cheesecloth may then be eliminated. A modified form of the backing or support fabric without the cheesecloth is shown in FIG. 7 and the same reference numerals have been applied to corresponding elements. This form of backing fabric after tufting and back coating is also shown in FIG. 8.

It will be noted that in a tufted fabric, such as tufted carpet, double thicknesses of the pile-forming yarns extend through the backing fabric at closely spaced intervals both across and lengthwise of the fabric and the double portions of the pile forming yarns exert lateral forces on the fabric. Although such forces are of a low order, the cumulative effect of such forces, particularly in a twelve to fifteen foot width of the tufted carpet, will cause the tufted fabric to grow or expand in both its widh and lengh when the backing fabric is formed from fibers having elastic properties, such as polypropylene.

Such growth takes place gradually and may not be uniform, particularly in instances of carpet where different pile yarns are used. Hence, the growth is likely to give rise to difficulties in subsequent manufacturing operations. However, this problem is overcome to a large extent by incorporation of the cheesecloth in the backing fabric as shown in FIGS. 9 and 10 as the threads of the cheesecloth will resist such forces.

When the fibers are deposited on the cheesecloth as shown in FIGS. 9 and 10 with the cheesecloth being adjacent the lower face of the web, the ends of some fibers are forced through the open mesh of the cheesecloth. This is called the beard side of the fabric. Thereafter, when the surface fibers on the beard side of the fabric are fused or bonded together, they also engage with and grip the threads of the cheesecloth and thus, prevent slippage or movement of the cheesecloth relative to the web of needled fibers. Under these conditions the fused fibers and the threads of the cheesecloth combine to resist and overcome the forces exerted on the backing fabric as a result of tufting and permit the desired dimensions to be maintained. When the fabric is tufted, it is preferable that the cheesecloth or the like be adjacent the upper or pile face of the carpet as shown in FIGS. 1 and 6.

The backing or support fabric may be made entirely from polypropylene fibers or from mixtures of polypropylene fibers with fibers of other materials such as nylon, rayon, acrylic, polyester or mixtures thereof. Polypropylene fibers have been found to have especially suitable characteristics particularly for use in conjunction with tufted carpet and are readily available in good supply and at low cost in most countries, including the United States. A satisfactory backing or support fabric for tufted carpet may be made from polypropylene fibers of 5 to 15 denier which are commonly produced commercially. If desired, fibers of different denier may be mixed.

In addition, fibers of other materials may be included in the mixture and the following is an example of a suitable mixture of fibers which may be employed in a backing fabric for tufted carpet: Polypropylene fibers (4½ in. staple)—90% (75%—6 denier; 25%—3 denier) and Rayon fibers (3 in. staple)—10%.

The rayon fibers in this mixture serve primarily as dye sites in the backing fabric so that its color will approximate the color of the pile yarns after dyeing. The content of rayon fibers may be increased to some extent, but it should not be increased to a point where substantial weakening of the backing fabric takes place.

In the above mixture of 3- and 6-denier polypropylene fibers, the 3-denier fibers will fill any voids or spaces between the larger 6-denier fibers and changes in these proportions can be made as desired.

As is customary, the polypropylene fibers are crimped and the crimp imparted by usual procedure employed in the United States; i.e., by overfeeding the filaments

as they are fed into a heated stuffing box, is satisfactory.

The bonding or fusing of the surface fibers also flattens upstanding fibers and provides a somewhat harder and smoother surface which will pass more readily beneath the needles of the tufting machine.

In the case of polypropylene fibers, the polypropylene fibers on the surface of the web may be bonded together by heating these fibers to a temperature slightly above their melting point for a short period of time so as to fuse the surface fibers without affecting the interior or remaining fibers of the web.

As noted above, the tufting needles penetrate the backing fabric repeatedly at closely spaced intervals in the tufting operation and in effect, form punctures or openings therein through which the double thickness of the pile yarns extend. With a conventional backing fabric, such as burlap, needle punctures which occur in the tufting tend to weaken the fabric. This is particularly true with woven fabrics such as burlap where strands of the backing fabric may be severed by the needles if proper care is not exercised. However, the tensile strength of a backing fabric embodying the subject invention is not appreciably reduced or diminished by the tufting and an increase in the overall tensile strength of the tufted pile fabric may result due to the compacting of the unbonded or unfused fibers in the interior center of the backing fabric in areas adjacent the points where the needles penetrate the fabric.

Tensile strength tests made of samples of nonwoven backing fabrics of several weights (8 oz., 6 oz., and 4 oz. fabrics) indicate that this is the case. In addition, the unbounded or unfused fibers which are compacted in areas surrounding the needle penetrations retain their resilient characteristics and thus, have a tendency to close on the portions of the pile forming yarns which extend through the backing fabric and to hold the pile yarns in place more effectively in the drawing of the loops than is the case with loosely woven backing fabrics such as burlap. Further, the backing fabric made in accordance with the subject invention will not fray.

A very distinct advantage of the backing fabric described herein over woven backings such as burlap is that no skewing of filling strands can take place and distortion in alignment of pile elements resulting therefrom is eliminated.

After the pile forming yarns have been tufted on the backing or support fabric, a suitable adhesive compound forming the back-coating **14** is applied to the rear face of the tufted backing fabric. The back-coating penetrates the backing fabric to some extent and it anchors the pile elements in place. A suitable back-coating compound for this purpose is a high solids synthetic latex base adhesive compound, such as is commonly used for tufted carpet.

In this connection, it should be noted that the backing or support fabric remains porous and the unbonded or unfused fibers on the interior thereof permit a considerable amount of the back-coating compound to be absorbed without having the compound penetrate to the pile face of the backing fabric. Thus, the hand of the tufted pile fabric can be varied by adjusting the amount of the adhesive compound applied thereto. Scrim or other suitable finish or covering materials may be applied, if desired, to the rear face of the tufted carept in the usual manner.

One way in which the backing or support fabric embodying the subject invention may be produced is illustrated schematically in FIGS. 9 and 10. Briefly, polypropylene fibers (or mixtures containing polypropylene fibers) are fed from feed boxes **30** onto garnets **31** which combine the fibers into layers which pass onto run-out chutes **32**. The run-out chutes traverse back and forth over a traveling conveyor or supporting element **33** which, as mentioned above, may be the low-count cheesecloth **15** and deposit the fiber layers thereon.

It is generally desirable to deposit more than one layer of the fibers on the conveyor element or cheesecloth so as to obtain a more even and uniform distribution of the fibers.

The conveyor element or cheesecloth is fed from a roll **34** through a J-box **35** from which it moves forward as a continuous web beneath the ends of the traversing run-out chutes to receive the fibers and thence, to a needling machine **36** carrying the layers of fibers deposited thereon with it. After leaving the needling machine, the needled web of fibers with the cheesecloth incorporated therein passes into another J-box **37** and then to a pair of heated rolls **38** and **39** which contact with the exterior surfaces of the needled web or bat.

In order to fuse fibers of polypropylene having a melting point of between 310° to 320° F., the surface fibers should be heated briefly to a temperature between 325° and 350° F. by contact with the rolls. When heated in this manner, the fibers in the center or interior of the web do not reach their melting temperature and will remain unbonded or unfused. When the fused fibers on the exterior surfaces of the web have been permitted to cool, the backing fabric may be then wound into a roll **40**.

The web may be run through a disc cutter to cut it to the desired width either before or after the surface treatment. Also, a suitable binder or solvent, such as an acrylic resin or a water resistant cure type latex may be sprayed on the surfaces of the web in liquid form and then dried to bind the surface fibers together in place of fusing them by heat.

The various pieces of apparatus mentioned above are conventional and hence need not be described in detail here.

It will be understood that various changes and modifications may be made by those skilled in the art in the particular embodiments of the tufted pile fabric and the method of producing the same which have been described above for illustrative purposes without departing from the scope of the invention as defined by the following claims.

We claim:

1. In a method of producing tufted carpet, the steps comprising:

(a) depositing fibers on a web of textile threads;

(b) then needling the fibers while supported on the web of textile threads into a cohesive sheet-like web;

(c) bonding the fibers at at least one surface of the sheet-like web to each other and to the textile threads at said surface while leaving the fiber portions in the interior of the web in an unbonded state; and

(d) then forming pile elements on the sheet-like web by tufting.

2. A method of producing tufted carpet as defined in claim **1** wherein:

(a) a majority of the fibers deposited on the textile threads are polypropylene fibers; and

(b) the polypropylene fibers which are bonded together as described in claim **1** are so bonded by heating those portions of said fibers at the one surface to a temperature above their melting point without similarly heating the remaining portions of the fibers in the interior of the web.

3. In a method of producing a backing fabric for tufted carpet, the steps which comprise:

(a) depositing one or more layers of fibers on a web of cheesecloth having warp filling threads;

(b) then needling the fibers throughout said layer into intimately intermixed relation relative to each other and into engagement with the threads of the cheesecloth;

(c) and then bonding fibers on at least one exterior surface of the needled material to each other and to the threads of the cheesecloth while leaving the fiber portions in the interior of the web in an unbonded state.

4. In a method of producing a backing fabric for tufted carpet, the steps as defined in claim **3** wherein:

(a) more than eighty percent (80%) of the fibers are of polypropylene; and

(b) the polypropylene fibers are bonded together and to the cheesecloth threads by fusing those portions of said fibers at the one exterior surface without fusing the remaining portions of the fibers in the interior of the web.

5. In a method of producing a non-woven fabric, the steps which comprise:

(a) depositing one or more layers of fibers on a supporting member;

(b) then needling the fibers throughout said layer into intimately intermixed relation relative to each other and into engagement with said member; and

(c) then bonding said fibers at at least one exterior surface of the needled layer to each other, while leaving the fiber portions in the interior of said layer in an unbonded state.

6. In a method of making a nonwoven fabric, the steps as defined in claim 5 wherein:

(a) said fibers are synthetic and of thermoplastic material and the bonding is accomplished by heating.

7. In a method of producing a nonwoven fabric, the steps which comprise:

(a) depositing a layer of fibers on a thin, sheet-like, flexible supporting member;

(b) then needling the fibers throughout said layer into intimately intermixed relation relative to each other, and into engagement with said member; and

(c) then bonding the fibers on at least one exterior surface of the needled layer into engagement with each other and with said member while at the same time leaving the fibers on the interior of said layer unbonded.

8. In a method of making a nonwoven fabric, the steps which comprise:

(a) depositing a layer of fibers, most of which are of synthetic thermoplastic material, on a sheet-like, flexible supporting member;

(b) needling said layer throughout its thickness at a multiplicity of closely spaced points extending over its surface area and thereby displacing vertically relative to the thickness of the layer at said points of needling portions of fibers from different levels of the layer; and

(c) heat bonding surface fibers and the supporting member together without bonding the interior fibers of said layer.

9. In a method of making a nonwoven fabric, the steps as defined in claim 6 wherein:

(a) said supporting member is a flexible moving sheet through which some of the needles and fibers are carried during said needling operation.

10. A method of producing a nonwoven fabric comprising the steps of:

(a) distributing a layer of fibers on a thin, flexible, sheet-like carrier;

(b) needling the layer of fibers and thereby entangling said fibers and forcing portions of said fibers through the carrier, thereby forming a needled web characterized by the presence of fibers at both web surfaces;

(c) bonding adjacent fiber portions at at least one surface of the web to each other while leaving those portions of the fibers adjacent the center of the web unbonded.

11. The method of claim 10 comprising bonding adjacent fiber portions at both surfaces of the web to each other while leaving those portions of the fibers adjacent the center of the web unbonded.

12. The method of claim 11 wherein the fibers are thermoplastic and the bonding is accomplished by heating the fiber portions to be bonded to their melting point, and thus fusing them, while maintaining the fiber portions adjacent the center of the web below their melting point.

13. The method of claim 10 wherein the fibers are thermoplastic and the bonding is accomplished by heating the fiber portions to be bonded to their melting point, and thus fusing them, while maintaining the fiber portions adjacent the center of the web below their melting point.

14. The method of claim 13 wherein the heating is accomplished by passing the web through the nip of a pair of rolls, one of said rolls being heated to a temperature above the melting point of the fibers.

15. The method of claim 13 wherein the heated and fused fibers are those which have been forced by needling through the carrier.

16. A method of making a tufted carpet comprising:

(a) depositing a layer of randomly oriented thermoplastic fibers on a thin, flexible, sheet-like carrier;

(b) forming a web by needling the fiber layer and thereby forcing portions of fibers from all parts of the layer down through the layer and through the carrier;

(c) fusing by heat portions of the fibers which have been forced through the carrier to each other while leaving those portions of the fibers which are located in the center of the web unfused;

(d) tufting the web with pile yarns.

17. The method of claim 16 comprising the step of applying an adhesive back coating to the rear face of the tufted fabric and thereby anchoring the yarn in place.

18. The method of claim 12 wherein the heating is accomplished by passing the web through the nip of a pair of rolls, both of which are heated above the melting point of the fibers.

19. A method of forming a nonwoven fabric comprising the steps of:

(a) depositing a layer of randomly oriented thermoplastic fibers on a thin, flexible, sheet-like carrier;

(b) forming a web by needling the fiber layer and thereby forcing portions of fibers from all parts of the layer down through the layer and through the carrier;

(c) fusing by heat portions of the fibers which have been forced through the carrier to each other while leaving those portions of the fibers which are located in the center of the web unfused.

20. The method of claim 15 wherein the fused fibers are heated and compressed against the carrier while in a melted state and are thereby fused to the carrier.

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* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the wallplate excellent in a carpet and surface printing nature excellent in properties, such as the endurance of the nonwoven fabric excellent in workability, dimensional stability, etc. at the time of carpet manufacture, such as strength of the cloth with a pile which carried out tough TINGU of tuft workability and the pile yarn, and dyeing-and-finishing nature, especially the primary base fabric for carpets and pile surface grace, pile yarn drawing strength, etc., and rigidity, and a resin adhesive property on the back.
[0002]
[Description of the Prior Art] As current and a primary base fabric for carpets, the textiles of polypropylene film slit yarn, the jute base fabric, the continuous glass fiber nonwoven fabric by the span bond method, etc. are used. Especially, the orderly nature of pile yarn is good and the primary base fabric for carpets using the continuous glass fiber nonwoven fabric by the span bond method is increasing from the advantage of a fray of fiber not arising. For example, it extrudes from the spinneret which carries out heating fusion of the thermoplastic synthetic resin, and has much pores as proposed by JP,61-8189,B. On the network which carries out an attraction drawing with the ejector mechanism which carries out high-speed attraction, and moves a filament, uptake, After considering as target eyes, fiber is mechanically interlaced by needle punch. The nonwoven fabric for carpets which is pasted up mutually and is furthermore obtained by adhesives, The sheath-core bicomponent fiber with which the low-melt point point component has covered the front face of fiber extensively by using as a heart component the polyethylene terephthalate proposed by JP,3-104973,A is used. Are proposed by JP,3-17948,B by the nonwoven fabric for carpets and pan which are made to carry out thermocompression bonding and are obtained with an embossing roll. A polyester filament The die-length direction, After making it the shape of a blind and interweaving with said polyester filament, before supplying the copolymerized polyester with the melting point lower than a polyester filament in the first half etc. to an adhesion component at air jet equipment in the nonwoven fabric manufacture of a rectangular organization by which was turned up crosswise and the laminating was carried out, The nonwoven fabric for carpets which comes to carry out heat joining through a heat cylinder is adopted.
[0003] After using a tough TINGU machine for these primary base fabric, carrying out the tuft of the pile yarn to it, creating the so-called cloth with a pile and a loop steamer type continuous dyeing machine's etc. dyeing pile yarn, by using various resin, such as a vinyl-chloride-resin paste, styrene-butadiene rubber (SBR) resin, and ethylene-vinyl acetate copolymerization resin, for the background of cloth with a pile, or carrying out needle punch of the nonwoven fabric without resin, the backing of the tufted carpet is carried out and it is manufactured. Also in a tufted carpet, a tile carpet is cut out after resin backing (for example, the shape of a tile, such as a square of 50cm angle) etc., and is manufactured.
[0004] Moreover, what printed print or gravure to the nonwoven fabric manufactured by the span bond method etc. is used for the wallplate.

[0005]
[Problem(s) to be Solved by the Invention] Such a primary base fabric for carpets For example, the thing which the orderly nature of the pile yarn which carried out the tuft is good, and the fiber of a base fabric does not loom in the surface section of pile yarn, Moreover, excel in a pile retention span and it sets at that there are few skip-stitch phenomena and pile omissions and a dyeing process. It excels in workability -- there is no fluff generating -- from a base fabric decision side at the time of that the width-of-face contraction by process tension is small, excelling in the heat dimensional stability in a backing process, or decision, and to be a low price is demanded. Moreover, endurance, rigidity, etc. of pile yarn drawing strength etc. are raised to the demand characteristics which can be equal to an activity as a carpet.
[0006] however, in the conventional primary base fabric for carpets for example, after making fiber interlace mechanically by needle punch, in the primary base fabric for carpets which gave adhesives, such as an emulsion system binder, was made to combine fiber, and was obtained Since the needle punch process and the desiccation process of an emulsion system binder are required, are high in price. Since thickness will become thick, the amount of the pile yarn used increases. Moreover, the weight of a carpet becomes heavy or The primary base fabric for carpets which was made to carry out thermocompression bonding of the web obtained with the sheath-core mold bicomponent fiber which problems, like cost becomes high arose and used the core part and the low-melt point point component for the sheath for the high-melting component with an embossing roll etc., and was obtained The result to which there is an inclination pasted up firmly since all fiber is adhesion fiber, and the base fabric penetration resistance with a tuft needle becomes large at the time of a tuft, Are easy to produce fiber cutting of a base fabric, and the inclination of powerful lowering of cloth with a pile is accepted. Moreover, the primary base fabric for carpets which was made to carry out thermocompression bonding of the web which there is a problem that the noise becomes large and was obtained by interweaving of high-melting component fiber and low-melt point point component fiber with an embossing roll etc., and was obtained It is in the inclination for the grace of a carpet to become [the fiber of a base fabric] the fiber indirect arrival force is low when there are few ratios of low-melt point point component fiber, and extruded [tend] by the surface section of pile yarn with a tuft needle at the time of a tuft bad. Moreover, a dimensional change becomes large in order to add processing tension under a wet heat condition at the time of the loop steamer passage at the time of continuous dyeing. The convention width of face of a carpet is not obtained. Start the poor yield of a product or conversely Since will be easy to produce fiber cutting with a tuft needle at the time of a tuft, and a high-melting component fiber number will become there are less and fiber indirect arrival mark will decrease, if there are many ratios of low-melt point point component fiber, [few] Since the thing for which two or more demand characteristics which can be set at each process are acquired with sufficient balance -- the base fabric strength which can be equal to processing is not acquired -- is difficult It was difficult to acquire the workability which should be satisfied in all the processes at the time of carpet manufactures, such as tuft workability, dyeing-and-finishing nature, and dimensional stability, and the actual condition was used in the range which can reach a compromise about the workability and the property in a certain process.
[0007] moreover, the conventional carpet, for example, the tufted carpet obtained by using the primary base fabric for tufted carpets The tufted carpet with which especially a nonwoven fabric is obtained using the primary base fabric by which fiber indirect arrival was carried out with adhesives, and the primary base fabric which consisted of only sheath-core mold bicomponent fibers The fiber of the front face located in the backing side of a primary base fabric pastes up firmly. To eye smooth backlash It was not what turns into a primary base fabric, a backing layer, and what has inadequate adhesion since backing resin does not permeate in a primary base fabric moderately, and can be satisfied about endurance, such as wear by a long-term walk or the activity of a chair with an axle-pin rake, and lack of pile yarn drawing on the strength called a pile omission.
[0008] Moreover, since fiber indirect arrival was firmly carried out also to a table lining and it was finished flat and smooth just because it thinks a surface printing property as important, when a nonwoven fabric was stuck on a wall with resin, the wallplate using the conventional nonwoven fabric

had the small adhesive strength in the interface of a nonwoven fabric and resin, and had the inconvenience from which a nonwoven fabric separates and falls depending on the case.
[0009] In view of this conventional nonwoven fabric especially the primary base fabric for tufted carpets, and a wallplate, this invention has properties, such as tuft workability, dyeing-and-finishing nature, and dimensional stability, with sufficient balance, and uses as an offer plug the wallplate in which the primary base fabric for carpets, the carpet and the surface printing property of excelling also in properties, such as the endurance of the pile surface grace after being manufactured by the tufted carpet moreover, pile yarn drawing strength, etc., and rigidity, and a resin adhesive property on the back are excellent.
[0010]
[Means for Solving the Problem] The following means are used for this invention in order to solve this technical problem.
[0011] namely, the thing which the nonwoven fabric of this invention is a continuous glass fiber nonwoven fabric with which the continuous glass fiber web which consisted of a low-melt point point polymer and a high-melting polymer was fixed by thermal melting arrival, and is characterized by preparing a heat bond strength difference in the table lining of this continuous glass fiber nonwoven fabric -- it is -- moreover, the primary base fabric for carpets of this invention -- this nonwoven fabric -- it is -- and the apparent density of this continuous glass fiber nonwoven fabric -- 0.15-0.4g/cm3 it is -- it is characterized by things. moreover, the thing characterized by carrying out tough TINGU of the pile yarn at this primary base fabric for carpets, and the carpet of this invention having a backing layer by resin or the nonwoven fabric -- it is -- the wallplate of this invention -- said nonwoven fabric -- it is -- and the apparent density of this continuous glass fiber nonwoven fabric -- 0.2 - 0.55 g/cm3 it is -- it is characterized by things.
[0012]
[Embodiment of the Invention] This invention has the property of acquiring the workability which should be satisfied in all the processes at the time of TAFUTTEDO carpet manufactures, such as tuft workability, dyeing-and-finishing nature, and dimensional stability, with sufficient balance. And can't the primary base fabric for carpets excellent in pile surface grace, endurance, etc. after being manufactured by the carpet be offered? When it inquires wholeheartedly, it studies that an above-mentioned demand can be attained splendidly to each property required of each production process and a product by making each function share with the surface and lining of a continuous glass fiber nonwoven fabric with sufficient balance. Moreover, when this nonwoven fabric is analyzed, it studies having a property also unexpectedly suitable as a wallplate.
[0013] That is, the fundamental thought in this invention is to prepare a heat bond strength difference in the table lining of the continuous glass fiber nonwoven fabric with which the continuous glass fiber web which consisted of a low-melt point point polymer and a high-melting polymer was fixed by thermal melting arrival, and have the suitable specific apparent density for the function of the primary base fabric for carpets, and a wallplate. That is, the reinforcement which can be equal to processing by making high heat bond strength of the surface of a continuous glass fiber nonwoven fabric, Give dimensional stability, and raise the rigidity of a carpet product, and the fluff from the nonwoven fabric generated on a pile front face by allotting the surface of a continuous glass fiber nonwoven fabric further to a pile side is controlled. the outstanding carpet surface grace -- bringing -- **** -- by making things and stopping lower than a surface the heat bond strength of the lining of a continuous glass fiber nonwoven fabric The property of grant of the pile retention span by the debt by base fabric penetration resistance, and the control and pile yarn of fiber cutting by the property which cannot be acquired in a surface function, for example, the tuft needle at the time of a tuft, It becomes a consistency nonwoven fabric layer. since it is furthermore low-fever bond strength -- tuft processing -- fiber -- a web -- ** --- izing -- low -- It is the thing which the moderate permeability of backing resin can be given [thing] by allotting a backing side, and the adhesion effectiveness with the backing layer by the anchor effect can be brought [thing] about, and can make the endurance of the pile drawing strength of a ** carpet etc. demonstrate. Since it has the function which each nonwoven fabric layer has independently with

sufficient balance according to the synergistic effect of the table lining of these continuous glass fiber nonwoven fabric, The carpet which can offer the primary base fabric for carpets which acquires the workability which should be satisfied in all the processes at the time of carpet manufacture, and is obtained using this primary base fabric The carpet equipped with the endurance which can be equal to carpet surface grace, the outstanding long-term walk, and the outstanding activity of a chair with an axle-pin rake, especially a tufted carpet can be offered.

[0014] The property of the table lining of this continuous glass fiber nonwoven fabric has some which are unexpectedly common in the property as a wallplate. That is, by becoming what was excellent in surface printing properties, such as a print and gravure, by making high heat bond strength of the surface of a continuous glass fiber nonwoven fabric, and stopping lower than a surface the heat bond strength of the lining of a continuous glass fiber nonwoven fabric In case resin adhesives are used for the wall of timber, concrete, etc. and a nonwoven fabric is stuck on it, when the fiber of a nonwoven fabric lining bears the function of support that resin adhesives tend to permeate in a nonwoven fabric The outstanding adhesive ability can be obtained and the wallplate excellent in the surface printing property and the resin adhesive property can be offered.

[0015] In order to obtain these functions, the heat bond strength of the surface of a continuous glass fiber nonwoven fabric is JIS. The 3rd more than class has the desirable abrasion resistance measured according to the Taber form method of an abrasion resistance trial of L-1906, and the 4th more than class is especially preferably desirable the 3.5th more than class more preferably. When the abrasion resistance of the surface of a continuous glass fiber nonwoven fabric is the 3rd less than class Since heat bond strength is low, when using as a primary base fabric for tufted carpets, The reinforcement which can bear processing tension is no longer obtained, width-of-face contraction arises during processing, and product convention width of face is not obtained. Cause aggravation of the yield or The fiber from the nonwoven fabric to a pile front-face top looms in the pan as for which required rigidity becomes is hard to be acquired. Since the problem of the so-called fluff occurring occurs, in using as a wallplate preferably Since fiber occurs in the shape of a fluff when surface smooth nature is hard to be obtained, and it is easy to produce a blot of ink at the time of a print or printing and it is used over a long period of time and an appearance is easy to be spoiled, it is not desirable.

[0016] Moreover, the heat bond strength of the lining of a continuous glass fiber nonwoven fabric is JIS. The 3rd less than class has the desirable abrasion resistance measured according to the Taber form method of an abrasion resistance trial of L-1906, and it is more preferably desirable that it is [2nd class / more than] the 2.5th less than class especially preferably the 3rd the class [1.5th / more than] less than class. When the abrasion resistance of the lining of a continuous glass fiber nonwoven fabric exceeds the 3rd class As a result of heat bond strength's becoming high, when a nonwoven fabric becomes hard too much and it uses as a primary base fabric for tufted carpets, The inclination for the base fabric penetration resistance with the tuft needle at the time of a tuft to increase, and for the noise to become large, The dimensional change under processing in order that fiber cutting of a nonwoven fabric may occur and the strength of the cloth with a pile after a tuft may decline becomes large. The problem which produces a sheet piece at the time of processing depending on the case arises, and permeating [of backing resin] becomes inadequate further at the time of backing. Since problems, such as being inferior to the endurance of the pile drawing strength of a tufted carpet etc., occur, when it uses as a wallplate preferably Since the front face is too smooth, in case resin adhesives are used for the wall of timber, concrete, etc. and it sticks on it, since it becomes difficult for resin adhesives to be unable to permeate easily in a nonwoven fabric, and to obtain sufficient adhesive strength, it is not desirable.

[0017] Still more preferably the heat bond strength difference of the surface of a continuous glass fiber nonwoven fabric, and a lining JIS That it is the 0.5th [at least] more than class when expressed with the abrasion resistance measured according to the Taber form method of an abrasion resistance trial of L-1906 Since the above-mentioned function can be made to share with the surface and lining of a continuous glass fiber nonwoven fabric with sufficient balance, it is desirable for a heat bond strength difference to be missing from a lining from the surface of a continuous glass fiber nonwoven fabric, and to have gradual bond strength inclination preferably, desirable especially.

[0018] In order to prepare a heat bond strength difference in the table lining of a continuous glass fiber nonwoven fabric, it is desirable that especially surface abrasion resistance makes it the structure gestalt of the following nonwoven fabrics since the abrasion resistance of the 3rd more than class and a lining has the property of the 3rd less than class. In addition, about the structure gestalt of the nonwoven fabric described below, it is desirable to use independently and to combine two or more more preferably.
[0019] First, to the 1st, the low-melt point point polymer content ratio of the surface of a continuous glass fiber nonwoven fabric is higher than the low-melt point point polymer content ratio of a lining, and things are desirable smoothly. Under the present circumstances, it is desirable that the ratio of the high-melting polymer of the surface of a continuous glass fiber nonwoven fabric and a low-melt point point polymer is [the ratios of 90:10-60:40, the high-melting polymer of a lining, and a low-melt point point polymer] 95:5-70:30 more preferably. It is desirable that the ratio of the high-melting polymer of the surface of a continuous glass fiber nonwoven fabric and a low-melt point point polymer is [the ratios of 85:15-70:30, the high-melting polymer of a lining, and a low-melt point point polymer] 90:10-80:20 especially preferably. If the low-melt point point polymer content ratio of the table lining of a continuous glass fiber nonwoven fabric is made the same, it will become difficult to prepare a heat bond strength difference in a table lining.
[0020] Moreover, if the low-melt point point polymer content ratio of the surface of a continuous glass fiber nonwoven fabric exceeds 40% A polymer fuses at the time of thermal melting arrival, and the whole sheet becomes the inclination of film-izing. There is an inclination for the base fabric penetration resistance at the time of a tuft to become large, and also in price and preferably, conversely, when a low-melt point point polymer content ratio is less than 10% There is an inclination it to become difficult to obtain the 3rd more than class of abrasion resistance, and the inclination which it does not have that imperfection and the required sheet reinforcement to like are difficult to get, and are easy to generate the fluff to a pile front-face top, and the heat adhesion between fiber becomes etc. arises.
[0021] If the ratio of the low-melt point point polymer of the lining of a continuous glass fiber nonwoven fabric exceeds 30%, fiber indirect arrival will become strong too much. There is an inclination it to become difficult to obtain the 3rd less than class of abrasion resistance, are easy to produce fiber cutting at the time of a tuft upwards, and Since permeating [of resin] is easy to become inadequate at a sake that it is easy to carry out densification, and adhesion strength required for nonwoven fabric gestalt maintenance becomes reverse is hard to be acquired when the ratio of a low-melt point point polymer is less than 5% It has [fuzz and the inclination which the problem on processing conveyance -- ******-come to be easy and fluff fiber coils around a roll etc. -- tends to generate] the sheet itself at the time of processing and is not desirable.
[0022] It is desirable to consist of polymers with the melting point of the low-melt point point polymer contained in the 2nd at the surface of a continuous glass fiber nonwoven fabric lower than the melting point of the low-melt point point polymer contained in a lining.
[0023] When there is no difference of the melting point of the low-melt point point polymer contained on the surface of a continuous glass fiber nonwoven fabric and the melting point of the low-melt point point polymer contained in a lining, it is in an inclination difficult to get about the heat bond strength difference in a table lining. Especially, it is JIS about the heat bond strength difference of the table lining of a continuous glass fiber nonwoven fabric. When expressed with the abrasion resistance measured according to the Taber form method of an abrasion resistance trial of L-1906, in order to consider more than as the 0.5th [at least] class It is desirable that it is an especially desirable polymer low 10-30 degrees C with the melting point of the low-melt point point polymer more preferably contained on the surface of a continuous glass fiber nonwoven fabric lower 5-50 degrees C than the melting point of the low-melt point point polymer contained in a lining.
[0024] Moreover, as for the melting point of a low-melt point point polymer, it is desirable that it is 20-80 degrees C below the melting point of a high-melting polymer, and it is 30-50 degrees C more preferably. There is an inclination which becomes inadequate [fiber indirect arrival reinforcement] when the melting point difference of the melting point of a low-melt point point polymer and a high-melting polymer is less than 30 degrees C, and when a melting point difference exceeds 80 degrees C, it

is easy to cause the poor spinning nature of the single-yarn piece to which it comes from the instability at the time of fiber spinning at the time of nonwoven fabric manufacture.
[0025] It is desirable from the fiber indirect arrival mark to which a thing with the fineness of the single fiber which constitutes the surface of a continuous glass fiber nonwoven fabric smaller than the fineness of the single fiber which constitutes a lining can set a surface increasing in the 3rd, and being able to prepare the heat bond strength difference in a table lining in it.
[0026] Under the present circumstances, when using for the primary base fabric for carpets, the fineness of a single fiber 2-15 deniers is desirable from viewpoints, such as control of fiber cutting at the time of a tuft, and reinforcement of a nonwoven fabric. When it is desirable that it is 6-10 deniers more preferably and the fineness of a single fiber is less than 2 deniers, Since it is easy to produce fiber cutting with the tuft needle at the time of a tuft, and it is in the inclination for the strength of cloth with a pile to decline, and it is in the inclination whose adhesion mark between fiber whose configuration fiber number per unit eyes decreases, and decrease when 15 deniers is exceeded, When it is because it becomes difficult to get and uses for a wallplate the strength which can be equal to processing, from viewpoints, such as spinning nature at the time of nonwoven fabric manufacture, and a printing property as a wallplate, 0.5-6 deniers is desirable and 1-3 deniers is more preferably desirable.
[0027] Especially, the abrasion resistance of the 3rd more than class and a lining has [the abrasion resistance of the surface of a continuous glass fiber nonwoven fabric] the property of the 3rd less than class. It is JIS about the heat bond strength difference of a table lining. When expressed with the abrasion resistance measured according to the Taber form method of an abrasion resistance trial of L-1906, in order to consider more than as the 0.5th [at least] class, preferably When it is desirable that the fineness of the single fiber from which the fineness of the single fiber which constitutes a surface constitutes 4-7 deniers and a lining in the case of the primary base fabric for carpets is 7-12 deniers and it is a wallplate It is desirable that the fineness of the single fiber from which the fineness of the single fiber which constitutes a surface constitutes 1-2 deniers and a lining is 3-5 deniers.
[0028] That by which the laminating of the nonwoven fabric layer (B) by which the high-melting polymer was constituted for the surface of a continuous glass fiber nonwoven fabric from interweaving of the fiber which a core part, the nonwoven fabric layer (A) by which the low-melt point point polymer was constituted from a sheath-core mold bicomponent fiber with which it consists of a sheath, and a lining become from a high-melting polymer, and the fiber which consists of a low-melt point point polymer is carried out to the 4th is desirable. That is, since a surface is a nonwoven fabric layer (A) which consisted of sheath-core mold bicomponent fibers in which all fiber has a function as heat adhesion fiber, it is because heat bond strength is easy to be obtained as compared with the nonwoven fabric layer (B) which consisted of interweaving of a lining and the heat bond strength difference in the table lining of a continuous glass fiber nonwoven fabric can obtain easily.
[0029] Under the present circumstances, when using for the primary base fabric for carpets, as for the eyes ratio of a nonwoven fabric layer (A) and a nonwoven fabric layer (B), 10:90-60:40 are desirable, and it is 30:70-50:50 more preferably. If the eyes ratio of the nonwoven fabric layer (A) which consists of sheath-core mold bicomponent fibers becomes less than 10% The bond strength of a base fabric total becomes low, the reinforcement which can bear processing tension is no longer obtained, and width-of-face contraction arises during processing. If product convention width of face is not obtained, but aggravation of the yield is caused, or it is in the inclination as for which required rigidity becomes is hard to be acquired and which the problem of the fluff to a pile front-face top occurring generates and the eyes ratio of a nonwoven fabric layer (A) exceeds 60% conversely As a result of a base fabric's becoming hard too much, it is in the inclination for the base fabric penetration resistance at the time of a tuft to become large, and for the noise to become large, and the inclination for fiber cutting to occur and for the strength of the cloth with a pile after a tuft to decline. Moreover, as for the eyes ratio of the nonwoven fabric layer in the case of using for a wallplate (A), and a nonwoven fabric layer (B), 30:70-95:5 are desirable, and it is 50:50-80:20 more preferably. if the eyes ratio of the nonwoven fabric layer (A) which consists of sheath-core mold bicomponent fibers becomes less than 30% -- surface surface common slippage **** -- when it is in the inclination for things to become difficult and the eyes ratio of

a nonwoven fabric layer (A) exceeds 95%, the inclination which becomes smooth too much is accepted and the front face of a lining is also in the inclination which an adhesive property with resin adhesives stops being able to acquire easily.
[0030] Moreover, in order to strengthen association between the layers of a nonwoven fabric layer (A) and a nonwoven fabric layer (B) and to make it unify in this invention, before carrying out thermal melting arrival, needle punch processing may be performed and the confounding of the fiber which exists between the layers of a nonwoven fabric layer (A) and a nonwoven fabric layer (B) may be carried out. In this case, more preferably, in order to control fluff generating on the pile front face after a tuft, it is good to perform needle punch processing from the nonwoven fabric layer (A) side which is a surface.
[0031] What adhesion immobilization of between the fiber of a continuous glass fiber nonwoven fabric is carried out with the resin binder, and has prepared the concentration gradient difference of a resin binder in the 5th at the table lining is desirable.
[0032] The approach of drying, after grant with the spray fuel spray or a roll, grant by the doctor knife, etc. carry out the approach and the emulsion type resin binder which are dried as an approach of preparing the concentration gradient difference of a resin binder in the table lining of a continuous glass fiber nonwoven fabric while carrying out migration of the resin binder to a surface side after sinking in an emulsion type resin binder from the surface side of a continuous glass fiber nonwoven fabric etc. can be used.
[0033] As a class of resin binder, acrylic ester system resin, vinyl acetate resin, ethylene-vinyl acetate copolymerization resin, vinyl chloride resin, polyester system resin, styrene-butadiene rubber, methyl-methacrylate-butadiene rubber, acrylonitrile-butadiene rubber, etc. can be used.
[0034] Under the present circumstances, as for the amount of grants to the continuous glass fiber nonwoven fabric of a resin binder, it is desirable that it is 5 - 30 % of the weight from viewpoints, such as reinforcement and a hand.
[0035] The thermal melting arrival approach for preparing a heat bond strength difference in the table lining of a continuous glass fiber nonwoven fabric the 6th can prepare a temperature gradient in a vertical roll using one pair of embossing rolls, and giving hot blast from a surface side using making high temperature by the side of the surface of a continuous glass fiber nonwoven fabric or a suction drum can use it preferably.
[0036] When using an embossing roll, 5 - 30% of sticking-by-pressure area is desirable, and it is 15 - 25% more preferably. It is because the whole sheet will serve as an inclination pasted up and film-ized if the reinforcement which can be equal to processing is hard to be obtained and sticking-by-pressure area exceeds 30%, since there is little adhesion area when sticking-by-pressure area is less than 10%, so it is easy to generate the problem to which the base fabric penetration resistance at the time of a tuft becomes large.
[0037] Furthermore, when using as a primary base fabric for carpets, the apparent density of a continuous glass fiber nonwoven fabric is 0.15 - 0.4 g/cm3. It is necessary to be the range and is 0.22 - 0.3 g/cm3 more preferably. It is desirable that it is the range. The apparent density of a continuous glass fiber nonwoven fabric is 0.15 g/cm3. Since the amount of the pile yarn used increases in order to obtain the pile height needed when it is in the inclination which is too thick in it being the following and the tuft of the pile yarn is carried out The apparent density of a continuous glass fiber nonwoven fabric is 0.40 g/cm3 to reverse preferably in cost. If it exceeds Since the base fabric penetration resistance with the tuft needle at the time of a tuft becomes large and permeating into the base fabric of backing resin becomes inadequate at the time of the inclination which the noise increases, or backing, it is in the inclination which becomes inadequate [the pile drawing strength of a carpet] and is not desirable.
[0038] Moreover, when using as a wallplate, the apparent density of a continuous glass fiber nonwoven fabric is 0.2 - 0.55 g/cm3. It is necessary to be the range and is 0.25 - 0.5 g/cm3 more preferably. It is desirable that it is the range. The apparent density of a continuous glass fiber nonwoven fabric is 0.2 g/cm3. As a result of a consistency's being too small in it being the following, in case printing etc. is performed, it is in the inclination which a blot of ink generates, and the apparent density of a continuous

glass fiber nonwoven fabric is 0.55 g/cm3 to reverse. It is in the inclination which a wrinkle etc. tends to generate in the case of the activity which a hand sticks on a wall by becoming hard too much and is not desirable if it exceeds.

[0039] Although what kind of polymers, such as polyester, polypropylene, a polyamide, and polyethylene, may be used for the high-melting polymer used by this invention, polyethylene terephthalate is especially preferably used from points, such as high intensity, heat dimensional stability, and weatherability. Moreover, although polyester, polypropylene, a polyamide, polyethylene, etc. may use which polymer also about a low-melt point point polymer, copolymerized polyester, such as adipic-acid copolymerized polyester from points, such as spinning stability at the time of nonwoven fabric manufacture and sheet eyes homogeneity by injection collision plate electrification, and isophthalic acid copolymerized polyester, is desirable.

[0040] In addition, in order to control fiber cutting at the time of a tuft if needed to the primary base fabric for carpets of this invention, it is also possible to give lubricating agents, such as poly dimethylsiloxane.

[0041] By carrying out the tuft of the pile yarn and performing the backing by resin or the nonwoven fabric using the primary base fabric for carpets obtained as mentioned above The endurance of the carpet grace which does not have fluff generating on a pile front face by arranging a surface especially with the high reinforcement of heat bond strength to a pile side, and arranging a lining with low heat bond strength to a backing side by the low consistency comparatively, pile drawing strength, etc., The carpet excellent in rigidity especially the tufted carpet, and the tile carpet can be obtained. Moreover, in using as a wallplate, in order to do the lamination activity to a wall simple, it is desirable to have a resin adhesive layer in the lining side of a continuous glass fiber nonwoven fabric.

[0042]

[Example] Although further explained to a detail based on an example below, it cannot be overemphasized that it is not that by which this invention is limited only to the following embodiments. in addition, the assessment approach of each property which can be boiled and set in the example is as follows.

[0043] (1) A scanning electron microscope (SEM) is used for the thickness of the apparent-density continuous glass fiber nonwoven fabric of a continuous glass fiber nonwoven fabric, and it is a thickness cross-section photograph in one 100 times the magnifying power of this Photography and 1m2 Thickness was counted for the average which measured the 20 hit thickness direction dimensions with slide calipers backward from the scale factor, and apparent density was computed by the degree type.

[0044] (Apparent density) =(eyes of continuous glass fiber nonwoven fabric)/(thickness average of a continuous glass fiber nonwoven fabric)

(2) About the abrasion resistance table lining of a continuous glass fiber nonwoven fabric, it is JIS. L-1906-1994 It measured according to the Taber form method of an abrasion resistance trial, and evaluated per the 0.5th class.

[0045] (3) Tensile strength JIS of a continuous glass fiber nonwoven fabric L-1906-1994 It applied correspondingly and measured. In addition, the longitudinal direction of a nonwoven fabric was indicated to be length, and the cross direction was indicated to be width.

[0046] (4) Set to a constant-rate-of-extension mold tension tester 44 tuft needles (222 train arrangement stagger, a needle kind; KPEmade from Organ- 41) set as base fabric penetration resistance 1 / 10 gage with the tuft needle of the primary base fabric for tufted carpets, and it is rate 20cm/min. The maximum load when thrusting at right angles to the primary base fabric for tufted carpets (nonwoven fabric) was measured.

[0047] The maximum load at this time is 18kgf(s). They are O and 18kgf -23kgf about the following. They are ** and 23kgf about the following. The above was evaluated as x.

(5) JIS after carrying out the tuft of the pile yarn (Nylon BCF, 2600-denier 160 filaments) to the primary base fabric for tufted carpets at the shape of a loop formation in 1/10 gage, stitch 12/an inch, and pile height of 3.5mm and obtaining cloth with a pile using the tensile strength tough TINGU machine of cloth with a pile L-1906-1994 It applied correspondingly and measured. In addition, the longitudinal

direction (the direction of a tuft) of the primary base fabric for tufted carpets was indicated to be length, and the cross direction was indicated to be width.
[0048] (6) The loop steamer type continuous dyeing machine dyed pile yarn for the cloth with a pile obtained with the dimensional-stability above (5) at the time of continuous dyeing, and width method change (width-of-face contraction) of the cross direction before and behind dyeing was measured.
[0049] In addition, O was evaluated for less than 8%, and, as for the dimensional stability which computed width-of-face contraction in {(width method after width method-dyeing before dyeing) width method before /dyeing} x100(%), this width-of-face contraction evaluated ** and 10% or more for 8 - 10% as x.
[0050] (7) The existence of fluff generating by which fiber loomed in the surface section of the pile yarn of the cloth with a pile after dyeing obtained with the surface grace above (6) of a tufted carpet from the base fabric was judged visually. There was no fluff generating, ** and fluff generating were remarkable in what fluff generating is accepted in O and a little in the thing excellent in grace, and grace evaluated the bad thing as x.
(8) Use the tile carpet obtained by performing backing with a vinyl-chloride-resin paste at the rear face of the cloth with a pile after dyeing obtained above (6) in the pile drawing strength of a tile carpet, and it is JIS-L1023-1992. It measured according to the case of the loop-formation pile of the trial by pile drawing strength. This pile drawing strength is 3.0kgf. They are O and 2.5-3.0kgf about the above. ** and 2.5kgf The following was evaluated as x.
[0051] (9) Use the tile carpet obtained by performing backing with a vinyl-chloride-resin paste at the rear face of the cloth with a pile after dyeing obtained with the rigid above (6) of a tile carpet, and it is JIS. L-1906-1994 It measured according to the 45-degree cantilever method of a bending resistance trial.

[0052] (10) The offset gravure method performed grid shank red monochrome printing on the surface of the printing nature continuous glass fiber nonwoven fabric of a wallplate, and printing nature was judged visually. There is no blot in the printed line and the blot of ** and the printed line evaluated the remarkable thing for that the blot was accepted to be to O and the printed line a little in the good thing of an ink paste as x.
[0053] (11) After applying the vinyl-acetate-resin emulsion (viscosity about 2000cps) to the resin adhesive property hinoki plywood of a wallplate and carrying out lamination desiccation of the lining side of a continuous glass fiber nonwoven fabric, when a continuous glass fiber nonwoven fabric was removed, the fiber adhesion condition which remains in a resin layer was judged visually. Moreover, after sticking and leaving it to a hinoki plywood as it is beforehand about what carries out resin ******** at the lining of a continuous glass fiber nonwoven fabric, when a continuous glass fiber nonwoven fabric was removed, the fiber adhesion condition which remains to resin was judged visually.

[0054] That whose rate of fiber adhesion area which remained that whose rate of fiber adhesion area which remained what carried out fiber adhesion of what the interface of a continuous glass fiber nonwoven fabric and a resin glue line did not separate, but separated in the interface of a resin layer and a hinoki plywood extensively in O and a resin layer in O and a resin layer is 50% or more in ** and a resin layer is less than 50% was evaluated as x.
[0055] The spinning and **** equipment in which an injection laminating is possible are used for a two-layer fiber web before and after an example 1-3. The polyethylene terephthalate whose melting point is 262 degrees C to a high-melting polymer The isophthalic acid copolymerized polyester whose melting point is 225 degrees C is made into a low-melt point point polymer. Many interweaving type mouthpieces of the high-melting polymer fiber which is number 30 hole, and low-melt point point polymer fiber are arranged. spinning equipment after fusing at 285 degrees C -- a mouthpiece -- aperture 0.5mmphi and a hole -- The weight ratio of the high-melting polymer of the surface of a continuous glass fiber web and a lining and a low-melt point point polymer After extruding a melting polymer and cooling so that it may become the (1) surface 85:15, a lining 85:15, the (2) surface 80:20, the lining 85:15 and (3) surface 80:20, and a lining 90:10, respectively, After opening electrification and a filament

bundle with the collision plate which carried out high-speed towage with ejector mechanism so that a single-yarn denier might turn into 8 deniers, and made lead the subject, uptake was carried out by injection and 4.3m piece on the network conveyor which moves. With the embossing roll of the couple whose sticking-by-pressure area is 18% succeedingly, roll temperature Continuous glass fiber web surface side roll 230degree C, It considers as lining side roll 220degree C, and is linear pressure 50 kg/cm. Apparent density is about 0.25 g/cm3. After carrying out thermocompression bonding so that it may become, the emulsion of dimethylpolysiloxane -- a spray -- solid content -- configuration fiber -- receiving -- about 2 wt(s)%, after making it adhere and drying for 2 minutes at 140 degrees C The slit was carried out so that it might become width of face of 4.2m, and surface abrasion resistance created the 3.0th more than class and three kinds of primary base fabrics for tufted carpets whose abrasion resistance of a lining is the 3.0th less than class.

[0056] Then, a tough TINGU machine is used and it is pile yarn (it nylon-BCF(s)) from the lining side of a primary base fabric. 2600 deniers and 160 filaments 1/10 gage, stitch 12/an inch, A tuft is carried out so that the thicket width of face of pile yarn may be set to about 4.1m by pile height of 3.5mm, and the loop formation (the surface side of a primary base fabric pile side). After the loop steamer type continuous dyeing machine dyed, open width desiccation was carried out at 130 degrees C so that the edge of a primary base fabric might be grasped by the pin tenter and the thicket width of face of pile yarn might be set to about 4.15m. The following vinyl chloride backing resin constituent (X) by 1.3mm in thickness on an endless belt Furthermore, coating, It is eyes 40 g/m2 on it. Sink in a glass fiber nonwoven fabric and coating of the following vinyl chloride backing resin constituent (Y) is further carried out by 1.3mm in thickness. After carrying out the laminating of the cloth with a pile (primary base fabric after a tuft) which carried out the preheat treatment to the upper part at about 100 degrees C and heat-treating a vinyl chloride backing resin constituent at 175 degrees C from an endless-belt side, it cooled, it judged on 50cm square, and the tile carpet was created.

[0057] A <vinyl chloride backing resin constituent (X)> vinyl chloride paste 100 weight sections dioctyl phthalate 90 weight sections carbonic acid calcium A 350 weight sections carbon toner Two weight sections <vinyl chloride backing resin constituent (Y)> vinyl chloride paste 100 weight sections dioctyl phthalate 95 weight sections carbonic acid calcium A 300 weight sections carbon toner The adipic-acid copolymerized polyester whose melting point is 194 degrees C about the low-melt point point polymer used for the surface of a 2 weight sections examples 4 continuous-glass-fiber web, The low-melt point point polymer used for a lining is made into the isophthalic acid copolymerized polyester whose melting point is 225 degrees C. Except the weight ratio of a high-melting polymer and a low-melt point point polymer having considered also on the table lining side roll as 220 degrees C also with the surface and the lining, 85:15 and embossing roll temperature are the same conditions as an example 1, and created the primary base fabric for tufted carpets, and the tile carpet.

[0058] The fineness of the single fiber of 5 deniers and a lining is the same conditions as an example 1 except being 10 deniers, and the fineness of the single fiber of the surface of an example 5 continuous-glass-fiber web created the primary base fabric for tufted carpets, and the tile carpet.

[0059] The spinning and **** equipment in which an injection laminating is possible are used for a two-layer fiber web before and after an example 6-7. The polyethylene terephthalate whose melting point is 262 degrees C to a high-melting polymer The isophthalic acid copolymerized polyester whose melting point is 225 degrees C is made into a low-melt point point polymer. the spinning equipment of the front row (lining) after fusing at 285 degrees C -- a mouthpiece -- aperture 0.5mmphi -- a hole -- so that many interweaving type mouthpieces of the high-melting polymer fiber which is number 30 hole, and low-melt point point polymer fiber may be arranged and the weight ratio of a high-melting polymer and a low-melt point point polymer may be set to 85:15 moreover -- the spinning equipment in the back row (surface) -- a mouthpiece -- aperture 0.5mmphi and a hole -- the high-melting polymer which is number 30 hole a heart side After extruding a melting polymer and cooling so that many mouthpieces of the sheath-core complex type whose low-melt point point polymer is a sheath side may be arranged and the weight ratio of a high-melting polymer and a low-melt point point polymer may be set to 80:20, High-speed towage is carried out with ejector mechanism so that a single-yarn denier may turn into 8 deniers.

After opening electrification and a filament bundle with the collision plate which made lead the subject, uptake was carried out by injection and 4.3m piece on the network conveyor which moves so that the eyes ratio of a surface sheath-core mold bicomponent fiber layer and the interweaving fiber layer of a lining may be set to (1) 30:70 and (2) 50:50.

[0060] With the embossing roll of the couple whose sticking-by-pressure area is 18% succeedingly, roll temperature is made into 220 degrees C also with a table lining side roll. Linear pressure 50 kg/cm Apparent density is about 0.25 g/cm3. After carrying out thermocompression bonding so that it may become, the emulsion of dimethylpolysiloxane -- a spray -- solid content -- configuration fiber -- receiving -- about 2 wt(s)%, after making it adhere and drying for 2 minutes at 140 degrees C The slit was carried out so that it might become width of face of 4.2m, and surface abrasion resistance created the 3.0th more than class and two kinds of primary base fabrics for tufted carpets whose abrasion resistance of a lining is the 3.0th less than class.

[0061] It pulled, and it continued and the tile carpet was created by the same approach as an example 1.

[0062] It is the laminating web of the sheath-core mold bicomponent fiber layer of example 8 example 6, and an interweaving layer 100 needle consistencies/cm 2 After carrying out needle punch from a sheath-core mold bicomponent fiber layer side, the primary base fabric for tufted carpets and the tile carpet were created on the same conditions as an example 6 except carrying out thermocompression bonding with an embossing roll.

[0063] After it carries out thermocompression bonding, using roll temperature of the embossing roll of example 9 couple as 210 degrees C also with a continuous glass fiber web table lining side roll, Impregnation is carried out into an ethylene-vinyl acetate copolymerization resin emulsion, and hot air drying equipment is used. 160-degree C hot blast only from a surface side Delivery, Except having carried out migration of the ethylene-vinyl acetate copolymerization resin to the surface side, and having made coating weight of the resin to a continuous glass fiber web into 10wt(s)%, it is the same conditions as an example 1, and the primary base fabric for tufted carpets and the tile carpet were created.

[0064] Except the weight ratio of a high-melting polymer and a low-melt point point polymer having considered also on the table lining side roll as 235 degrees C also with the example of comparison 1 table lining, 75:25 and embossing roll temperature are the same conditions as an example 1, and created the primary base fabric for tufted carpets, and the tile carpet.

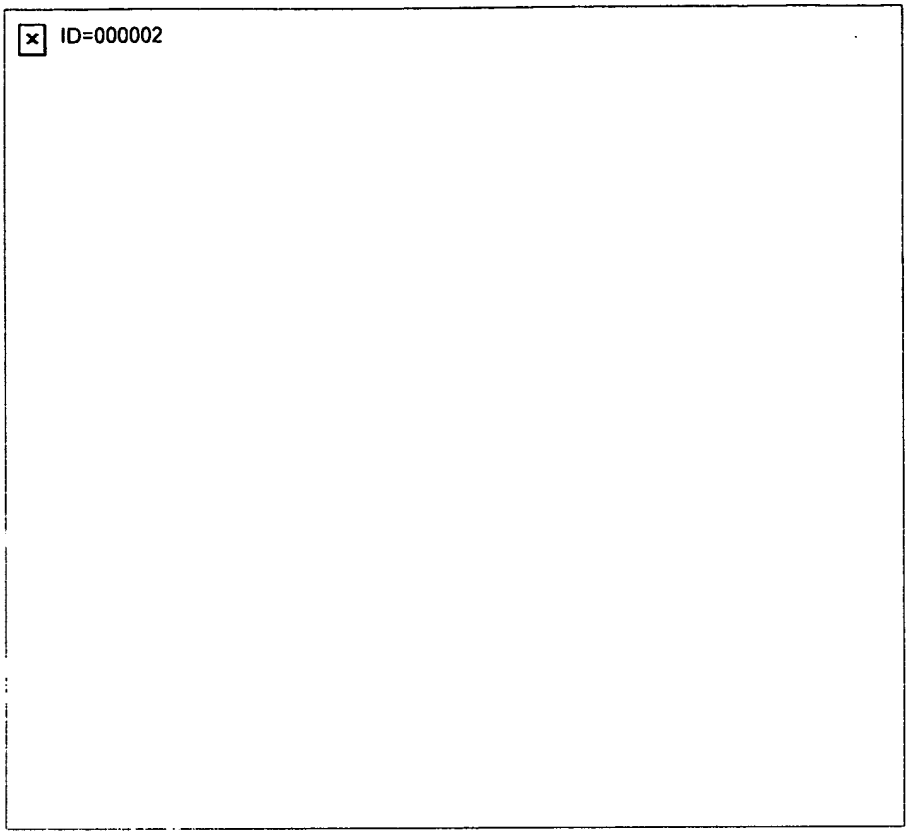
[0065] The number of table linings of the abrasion resistance of the primary base fabric for tufted carpets at this time was 4.5.

[0066] Except the weight ratio of a high-melting polymer and a low-melt point point polymer having considered also on the table lining side roll as 220 degrees C also with the example of comparison 2 table lining, 95:5 and embossing roll temperature are the same conditions as an example 1, and created the primary base fabric for tufted carpets, and the tile carpet. The number of table linings of the abrasion resistance of the primary base fabric for tufted carpets at this time was 2.0.

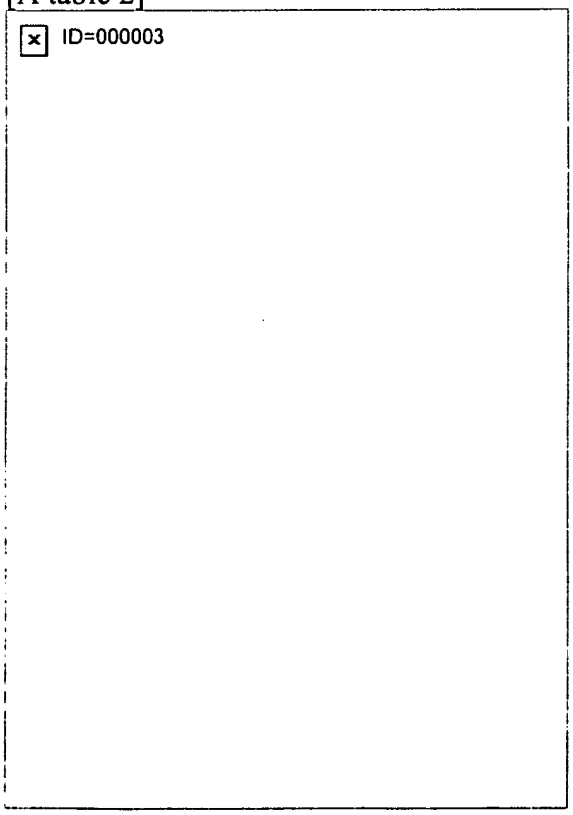
[0067] example of comparison 3 example 1 -- setting -- a table lining side -- spinning equipment -- a mouthpiece -- aperture 0.5mmphi -- The high-melting polymer which is number 30 hole arranges many mouthpieces of the sheath-core complex type a heart side and whose low-melt point point polymer are sheath sides. a hole -- The weight ratio of a high-melting polymer and a low-melt point point polymer was set to 80:20, and it considered as 230 degrees C also with the table lining side roll, and except the lever, embossing roll temperature is the same conditions as an example 1, and created the primary base fabric for tufted carpets, and the tile carpet. The number of table linings of the abrasion resistance of the primary base fabric for tufted carpets at this time was 4.0.

[0068] The property of the primary base fabric for tufted carpets of examples 1-9 and the examples 1-3 of a comparison was shown in tables 1-2 about workability and the property of a tile carpet at tables 3-4.

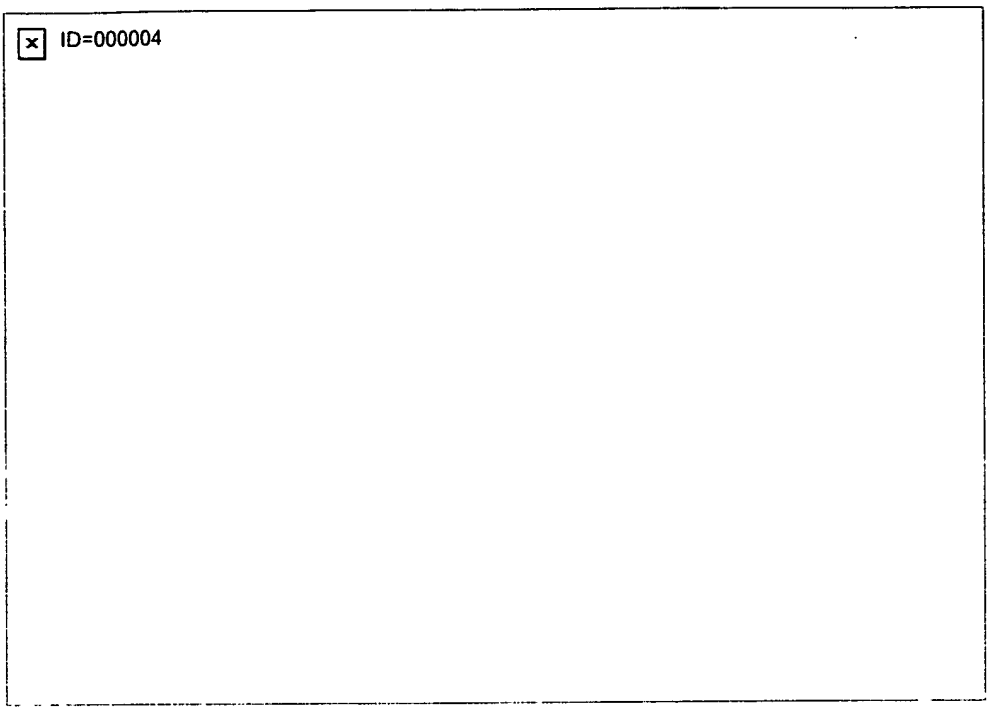
[A table 1]



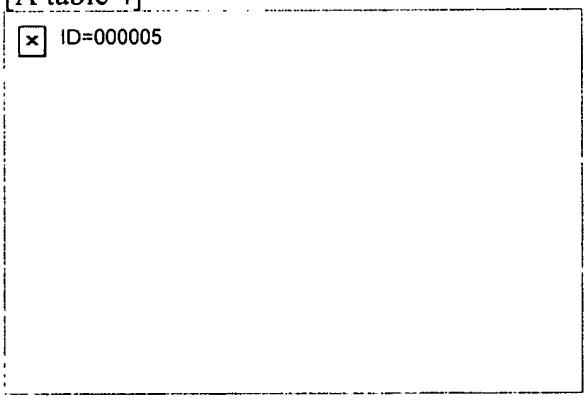
[A table 2]



[A table 3]



[A table 4]



As shown in a table 3 and a table 4 as mentioned above, the primary base fabric for tufted carpets of examples 1-9 What especially made surface abrasion resistance the 3rd more than class, and made abrasion resistance the 3rd less than class for the lining The base fabric penetration resistance at the time of the tuft which is a property required for tufted carpet processing as compared with the examples 1-3 of a comparison, the strength of cloth with a pile, and the dimensional stability at the time of continuous dyeing -- it excelled in all and the tufted carpet (tile carpet) using the primary base fabric of this invention was further excellent also in the endurance of pile surface grace, pile drawing strength, etc., and rigidity.

[0069] The spinning and **** equipment in which an injection laminating is possible are used for a two-layer fiber web before and after an example 10-12. The polyethylene terephthalate whose melting point is 262 degrees C to a high-melting polymer The isophthalic acid copolymerized polyester whose melting point is 225 degrees C is made into a low-melt point point polymer. Many interweaving type mouthpieces of the high-melting polymer fiber which is number 30 hole, and low-melt point point polymer fiber are arranged. spinning equipment after fusing at 285 degrees C -- a mouthpiece -- aperture 0.5mmphi and a hole -- After extruding a melting polymer and cooling so that the weight ratio of the high-melting polymer of the surface of a continuous glass fiber web and a lining and a low-melt point point polymer may serve as the (1) surface 85:15, a lining 85:15, the (2) surface 80:20, the lining 85:15

and (3) surface 80:20, and a lining 90:10, respectively, After opening electrification and a filament bundle with the collision plate which carried out high-speed towage with ejector mechanism so that a single-yarn denier might turn into 2 deniers, and made lead the subject, uptake was carried out by injection and 4.3m piece on the network conveyor which moves. Roll temperature is made into continuous glass fiber web surface side roll 235degree C and lining side roll 220degree C with the embossing roll of the couple whose sticking-by-pressure area is 18% succeedingly, and it is linear pressure 60 kg/cm. Apparent density is about 0.4 g/cm3. Thermocompression bonding was carried out so that it might become, and surface abrasion resistance created the 3.0th more than class and three kinds of wallplates whose abrasion resistance of a lining is the 3.0th less than class.

[0070] Except the weight ratio of a high-melting polymer and a low-melt point point polymer having considered the adipic-acid copolymerized polyester whose melting point is 194 degrees C about the low-melt point point polymer used for the surface of an example 13 continuous-glass-fiber web, and the low-melt point point polymer which uses for a lining as 220 degrees C also on the table lining side roll also with the surface and the lining by considering as the isophthalic acid copolymerized polyester whose melting point is 225 degrees C, 80:20 and embossing roll temperature are the same conditions as an example 10, and created the wallplate.

[0071] The fineness of the single fiber of 1 denier and a lining is the same conditions as an example 10 except being 5 deniers, and the fineness of the single fiber of the surface of an example 14 continuous-glass-fiber web created the wallplate.

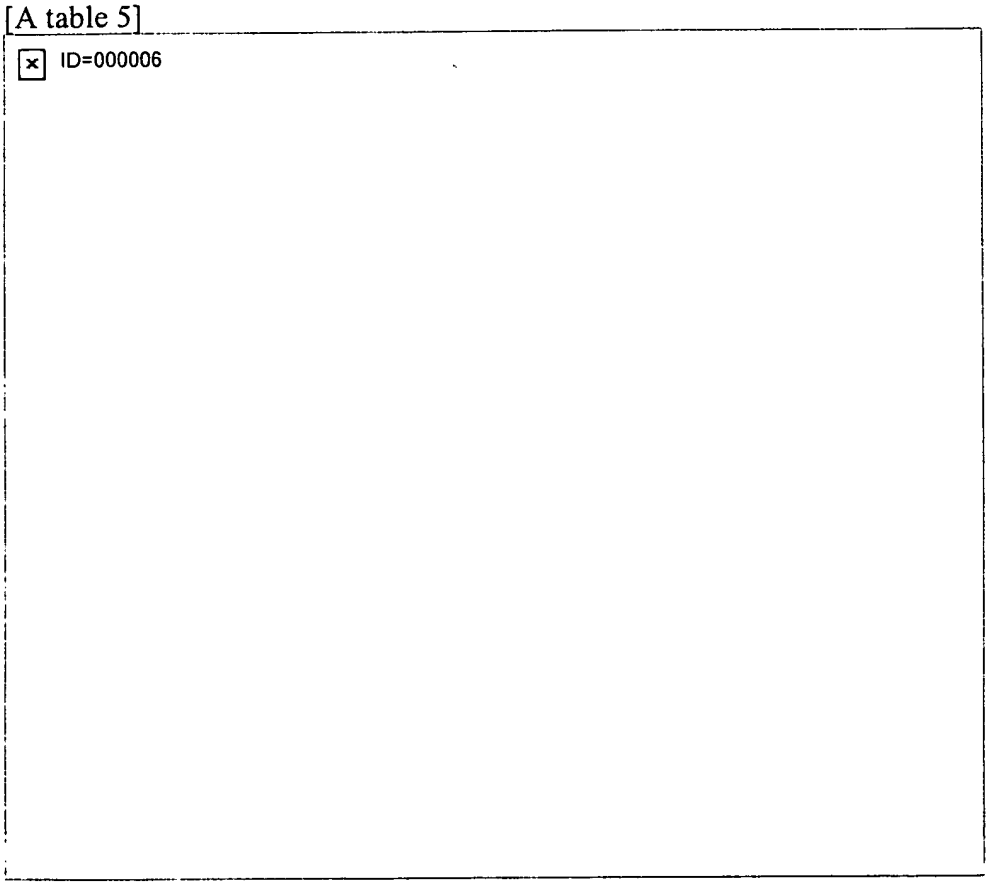
[0072] The spinning and **** equipment in which an injection laminating is possible are used for a two-layer fiber web before and after an example 15-16. The polyethylene terephthalate whose melting point is 262 degrees C to a high-melting polymer The isophthalic acid copolymerized polyester whose melting point is 225 degrees C is made into a low-melt point point polymer. the spinning equipment of the front row (lining) after fusing at 285 degrees C -- a mouthpiece -- aperture 0.5mmphi -- a hole -- so that many interweaving type mouthpieces of the high-melting polymer fiber which is number 30 hole, and low-melt point point polymer fiber may be arranged and the weight ratio of a high-melting polymer and a low-melt point point polymer may be set to 85:15 moreover -- the spinning equipment in the back row (surface) -- a mouthpiece -- aperture 0.5mmphi and a hole -- the high-melting polymer which is number 30 hole a heart side After extruding a melting polymer and cooling so that a low-melt point point polymer may arrange many mouthpieces of the sheath-core complex type which is a sheath side and may be set to 70:30 in the weight ratio of a high-melting polymer and a low-melt point point polymer, High-speed towage is carried out with ejector mechanism so that a single-yarn denier may turn into 2 deniers. After opening electrification and a filament bundle with the collision plate which made lead the subject, uptake was carried out by injection and 4.3m piece on the network conveyor which moves so that the eyes ratio of a surface sheath-core mold bicomponent fiber layer and the interweaving fiber layer of a lining may be set to (1) 50:50 and (2) 80:20. With the embossing roll of the couple whose sticking-by-pressure area is 18% succeedingly, roll temperature is made into 220 degrees C also with a table lining side roll, and it is linear pressure 60 kg/cm. Apparent density is about 0.4 g/cm3. Thermocompression bonding was carried out so that it might become, and surface abrasion resistance created the 3.0th more than class and two kinds of wallplates whose abrasion resistance of a lining is the 3.0th less than class.

[0073] After it carried out thermocompression bonding, having used roll temperature of the embossing roll of example 17 couple as 215 degrees C also with the continuous glass fiber web table lining side roll, except having carried out impregnation into the acrylic ester resin emulsion, having carried out migration of the acrylic ester resin for 160-degree C hot blast to the delivery and surface side only from the surface side using hot air drying equipment, and having made coating weight of the resin to a continuous glass fiber web into 15%, it is the same conditions as an example 10, and the wallplate was created.

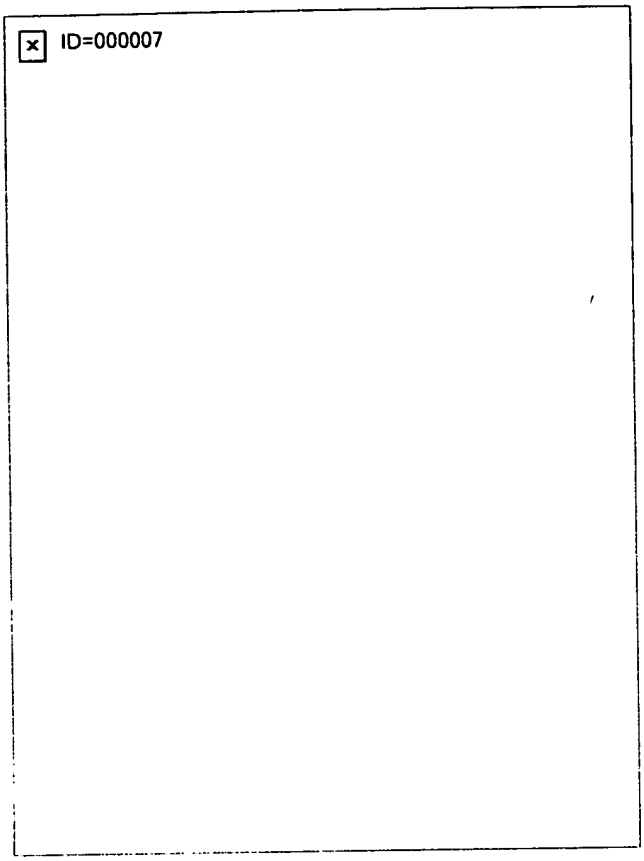
[0074] The wallplate which prepared the resin adhesive layer with a thickness of 0.5mm in the lining side of the wallplate of example 18 example 14 was created.

[0075] Except the weight ratio of a high-melting polymer and a low-melt point point polymer having

considered also on the table lining side roll as 235 degrees C also with the example of comparison 4 table lining, 75:25 and embossing roll temperature are the same conditions as an example 10, and created the wallplate. The number of table linings of the abrasion resistance at this time was 4.5.
[0076] Except the weight ratio of a high-melting polymer and a low-melt point point polymer having considered also on the table lining side roll as 220 degrees C also with the example of comparison 5 table lining, 95:5 and embossing roll temperature are the same conditions as an example 10, and created the wallplate. The number of table linings of the abrasion resistance at this time was 2.5.
[0077] example of comparison 6 example 10 -- setting -- a table lining side -- spinning equipment -- a mouthpiece -- aperture 0.5mmphi -- The high-melting polymer which is number 30 hole arranges many mouthpieces of the sheath-core complex type a heart side and whose low-melt point point polymer are sheath sides. a hole -- The weight ratio of a high-melting polymer and a low-melt point point polymer was set to 70:30, and it considered as 230 degrees C also with the table lining side roll, and except the lever, embossing roll temperature is the same conditions as an example 10, and created the wallplate. The number of table linings of the abrasion resistance at this time was 5.0.
[0078] The property of the wallplate of examples 10-19 and the examples 4-6 of a comparison was shown in tables 5-6.
[0079]
[A table 5]



[A table 6]



That to which the wallplate of examples 10-19 made surface abrasion resistance the 3rd more than class, and made abrasion resistance the 3rd less than class for the lining was excellent in the surface printing property and the resin adhesive property as compared with the examples 4-6 of a comparison as shown in a table 5 and a table 6. [especially]

[0080]

[Effect of the Invention] The nonwoven fabric of this invention, especially the primary base fabric for carpets, for example, the primary base fabric for tufted carpets The carpet which has the engine performance which acquires the workability which should be satisfied in all the processes at the time of carpet manufactures, such as tuft workability, dyeing-and-finishing nature, and dimensional stability, with sufficient balance, and used this base fabric It has the effectiveness of excelling also in engine performance, such as the endurance of pile surface grace, pile yarn drawing strength, etc., and rigidity, and has the effectiveness that a wallplate is excellent in a surface printing property and a resin adhesive property and.

[Translation done.]